A

SYSTEM

FOR THE

DISCIPLINE

OF THE

ARTILLERY OF THE UNITED STATES OF AMERICA,

OR, THE YOUNG ARTILLERIST'S

POCKET COMPANION.

IN THREE PARTS.

PART I.

CONTAINING: The formation of a Corps of Artillery, and the duty and practice of light Field Artillery, &c.

PART II.

CONTAINING: The theory and practice of heavy Artillery, in Garriſon and on board the Navy; and an extract of a Treatiſe on the origin and principles of Courts Martial.

PART III.

CONTAINING: Laboratory duty; a great variety of directions for Compoſitions, and the method of making Artificial Fire Works, with the formation of Ammunition neceſſary for the different kinds of Ordnance.

IN THREE VOLUMES.

By WILLIAM STEVENS.

An Officer in the AMERICAN ARTILLERY through the whole of the late Revolution, and ſince in the Militia.

NEW-YORK.
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FOR THE AUTHOR.
—1797—

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BRITISH MUSEUM

THIS

SYSTEM OF DISCIPLINE,

FOR THE

ARTILLERY,

IS RESPECTFULLY INSCRIBED

TO

THE OFFICERS OF THE LATE CONTINENTAL ARMY,

AND

THE MILITIA OF THE UNITED STATES,

BY

Their moſt obedient,
And very humble ſervant,
WILLIAM STEVENS.

ADVERTISEMENT.

THE Author is unhappy, that he has been neceſſitated to delay this publication, ſo long after the firſt propoſals were offered to the public; but, a degree of diffidence, and emigrating into a new country, has been the cauſe; in the intermediate ſpace of time, he has had an opportunity to correct ſome errors, and add additional matter to the Work, which may be of utility to the reader;—He will complete the other volumes, as ſoon as circumſtances will admit, agreeable to the wiſh of his friends in the Militia, *&c.*

The names of the ſubſcribers will be inſerted in the Third Volume.—Thoſe who may be intruſted with ſubſcription papers when filled are requeſted to return them to the Agents appointed in each State, that they may be tranſmitted to the printer, for inſertion as above ſpecified.

Recommendation of Brigadier-General John Lamb, *in promoting the publiſhing of the following work.*

From my knowledge of capt. William Stevens, who ſerved in the regiment of artillery, formerly under my command, and his abilities as an artilleriſt; I am perſuaded that the ſyſtem of diſcipline for the artillery of the United States, which he propoſes publiſhing, will be of great utility in forming and inſtructing young officers of that corps in the line of their duty, and in qualifying them for their reſpective ſtations.

New-York, 20th July, 1797. John Lamb.

Recommendation of Lieut. Col. Ebenezer Stevens, *late commandant of the artillery in the northern and middle department, in the American Revolution.*

Mr. Wm. Stevens,
Sir,

I have peruſed your work, entitled "A ſyſtem of diſcipline for the artillery of the United States, or, the young artilleriſt's pocket companion, in three volumes," and am of opinion that it is well adapted for inſtructing the artilleriſts of the United States in the theory of that ſcience, and a uſeful *Vade Mecum* for thoſe who are in actual ſervice: ſhould you think fit to comply with the wiſhes of your friends to publiſh it, I ſincerely wiſh it may meet with the encouragement it merits; and remain, with regard,

Your very humble ſervant,

New-York, July 5th, 1797. E. Stevens.

INTRODUCTION.

It will, in all probability, be deemed a preſumption in me to publiſh a ſyſtem for the diſcipline of the artillery in the United States of America, when there are ſo many reſpectable military characters in it, of ſuperior abilities and experience in this important branch of military knowledge.

There have been many able authors, who have largely written on military diſcipline, but principally adapted to the infantry, among whom was that diſtinguiſhed officer and reſpectable character, Baron Steuben, late major general aad inſpector general of the American army, who wrote regulations of diſcipline for the army, in which he attended to the minute parts of the duty of the infantry, but touched very lightly ón that of the artillery.

Several authors have written on the theoretical part of artillery, but the manual exerciſe of field artillery has been tranſmitted by tradition, which accounts, in ſome meaſure, for the variety in this part of duty, among artilleriſts.

It is, therefore, abſolutely neceſſary to have a uniformity in the exerciſe of artillery, as well as that of infantry, there not being any in particular adopted, but every officer teaching the men he exerciſes, according to the traditionary idea he forms of this part of duty, as an artilleriſt.

The many difficulties which occur in exerciſing a detachment from different regiments, as well as companies (each officer deviating, in ſome point, from another), has a tendency to confuſe a ſoldier in the exerciſe of his duty.

As it is the duty of an officer to ſtudy that which may be for the utility of the ſervice he is in, and as a well regulated militia, in a republican government, is the ſafeſt protection of the lives and property of the citizens, government being ſenſible of the importance of it, has, in the organization of the military force of the Union, divided it into a number of different corps, to anſwer the various parts of ſervice, amongſt which are the corps of artillery, in which there may be many gentlemen appointed to commiſſions who never had an opportunity of acquiring experience in ſervice, and for want of a regular ſyſtem being eſtabliſhed for their guide, ſimilar to that of the infantry, will be put to the greateſt difficulty in performing their duty as artilleriſts in exerciſing their men.

Under theſe conſiderations, I am induced to offer this ſyſtem for the artillery, conforming to an old military maxim, that every officer ought to be a ſoldier, although every ſoldier cannot be an officer. It is neceſſary on this principle, that every commiſſioned officer ſhould be perfectly acquainted with the minute parts of duty of the non-commiſſioned officers and matroſſes, by which means he will appear reſpectable in his command, and be able to render that ſervice to his country, which it has a right to expect from his appointment.

I have ſeen ſome gentlemen who ſeemed to ſuppoſe (after obtaining a commiſſion) that to be cloathed in a uniform ſuit and poſſeſs the ſpirit of gallantry on the moſt refined moderne taſte, were the only eſſential accompliſhments for a military character; but I can aſſure thoſe gentlemen that they are miſtaken in their ideas, as their country repoſes eſpecial truſt and confidence in their abilities, &c. Therefore, to acquire a knowledge which enſures a confidence from their ſuperior officers, and to appear reſpectable in their command, is only attained by application and ſtudy, which opens in their mind an agreeable and extenſive field to ſpeculate on the variety which compoſe their duty as artilleriſts.

The duties of an artilleriſt are very extenſive; he ought to make himſelf acquainted with part of mathematics; ſuch as geometry, logarithms, trigonometry, and menſuration; have ſome idea of natural philoſophy, and a knowledge of the doctrine of projectiles, &c. He ſhould poſſeſs a mechanical genius, in the conſtruction of all warlike machines, and have an idea of the principle of perſpectives and deſigning: and alſo of the nature of compoſitions of all ſorts uſed in artillery, either for defence or rejoicing, and the manner of forming them.

As the ſmall ſize of a pocket volume would not admit of treating on the different parts of the duty, I have thought it beſt to divide this work into three parts, in order to make it more portable and convenient.

In the firſt part, I have attended to the practical part for the uſe of field artillery, and have collected every thing which, to me, appeared eſſential for that purpoſe, from the beſt authorities. The ſecond part contains the theoretical and practical parts of duty, by a gradual progreſſion, and the principles founded on the moſt modern improvements and experience, and as an acquaintance with the origin and principles of a court martial muſt be of importance to every military man, whereby he may ward off thoſe dangerous errors to which he might otherwiſe be expoſed in the execution of the martial laws. The third part contains the duty of the laboratory, in all the eſſential preparation of combuſtibles, of fire-works in all its various parts and the formation of ammunition for the different kinds of ordnance, *&c.*

I have thought that a military academy in the United States would be of great utility, founded on liberal principles, as a nurſery of military diſcipline; it being a ſcience of the greateſt importance for the protection of the lives and fortunes of the citizens, whereby officers graduated in *tactics**, would be able to head the *militia*, and appear reſpectable in their different commands, and formidable to our enemies.

It is hoped that the united wiſdom of the American empire will attend to the importance of the ſubject, and eſtabliſh the militia on the moſt reſpectable principles, to anſwer the wiſhes of the community.

The foregoing obſervations I have offered, but a ſufficient apology for this attempt muſt reſt on the candor of the reader. From the beſt enquiries that I have been able to make, there has not been any thing on this plan printed; and the neceſſity of a ſyſtem for the artillery, muſt be obvious to every well-wiſher of his country.

I have attended to thoſe parts of the duty, with which I conceived it neceſſary that the young artilleriſt ſhould be acquainted, and have endeavoured to explain every part of the exerciſe minutely. Some indeed may think me too triflingly particular; but I have inſerted nothing but what, when the duty of artillery was entirely new to me, would have been very acceptable to me, and have ſaved me time and application.

I muſt acknowledge myſelf greatly indebted to Baron Steuben's regulations for the diſcipline of the army, from which I have received abundant aſſiſtance in blending the duty of the artillery with that of the infantry: where they are connected in the following work, I have adopted its principles, and have extracted from it whatever I judged neceſſary or uſeful to my plan, in multitudes of inſtances, without noting the places from whence the extracts were made.

With the like freedom I have uſed ſome obſervations from Meſſrs. Sims, Muller, Robins, &c. and the practice which others ſuggeſted, not regarding from whence an improvement originated, but having this ſimple point in view, the good of my country, and hoping that ſome more able pen would diſplay their genius in pointing out a better ſyſtem, in the practice as well as the theory of artillery; whereby the officers and ſoldiers may be taught a uniformity in doing their duty, that, when on detachment from different regiments or companies, they may not be embarraſſed by different modes of exerciſe.

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* If tactics were introduced as one degree in the education of the Americans, it would be of more utility than the dull ſtudy of the dead languages.

The following treatiſe I have endeavoured to make plain and uſeful; as to the language, it is far from being ſo correct as I could have wiſhed; but where utility is the aim, even critics are ſeldom diſpoſed to cenſure a young author in his firſt performance, for a few inaccuracies of ſtyle.

Such as read this book with a view to this kind of criticiſm, will find matter enough, and I ſhall be far from deſpiſing their friendly obſervations. But, as I would ſtill wiſh to render the performance more generally uſeful, ſhall eſteem every man my friend who will be ſo kind as to point out any thing that may contribute to the purpoſe.

If the work, ſuch as it is, ſhall facilitate the young artilleriſt, or any other character, in getting an acquaintance with the military art, and ſo prove beneficial to my country, I ſhall obtain my higheſt wiſh.

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A SYSTEM FOR THE DISCIPLINE *of the* ARTILLERY, &c.

PART I.

CHAPTER I.

Of Recruiting and forming a Company of Artillery.

BEFORE we begin the exerciſe, it may not be improper to ſay a few words concerning the recruiting of a company. As the corps of artillery is of the greateſt importance, and the nature of their ſervice is ſuch that government is neceſſitated to repoſe the greateſt truſt in them, they having the charge of all the ordnance, and ordnance ſtores of the army.

Therefore it requires the greateſt precaution in the recruiting ſervice, to inliſt ſuch men only whoſe good characters and fidelity may anſwer the juſt expectations of their country. And as their duty requires ſtrength and activity, the officers ought to pay particular attention in procuring ſtout, active men, who will be able to perform the fatiguing parts of their duty, and add to the appearance and reſpectability of the corps.

As government hath ſeen fit that the corps of artillery be ſelected out of the body of the militia, no excuſe can be admiſſible for not procuring men of reputable characters, which will naturally cauſe an emulation, and eſtabliſh the artillery on the moſt honorable principles.

The eſtabliſhment of a company varies in the different ſervices. In the American ſervice, during the late war with Great Britain, it conſiſted of one captain, one captain lieut. one firſt lieut. and three ſecond lieutenants; ſix ſerjeants, ſix corporals, ſix bombardiers, ſix gunners, one drummer, one fifer, and thirty-nine matroſſes. Then the eſtabliſhment of a company, officers included, were ſixty-one.

Since the cloſe of the war the number of commiſſioned and non-commiſſioned officers has been reduced, and the eſtabliſhment varied in the different ſtates in the union. In the Commonwealth of Maſſachuſetts, a company conſiſted of one captain, one captain lieut. one firſt lieut. two ſecond lieutenants, four ſerjeants, four bombardiers, one drummer, one fifer, and forty-ſix matroſſes.

Agreeable to a law of the United States eſtabliſhing an *Uniform Militia* throughout the Union,—a company of artillery is to contain one captain, two lieutenants, four ſerjeants, ſix bombardiers, ſix gunners, one drummer, one fifer, and ſixty-four matroſſes; but may be augmented or reduced according to the nature of the ſervice they are in.

In carrying on a ſiege, the bombardiers are formed into a company, with a proportion of commiſſioned and non-comiſſioned officers, who are taught the duty of the laboratory, and attend to the preparation of all kinds of ammunition, fire-works, *&c.* and alſo have the management of the mortars in the bomb batteries.

The reaſon of a greater number of commiſſioned and non-commiſſioned officers in the artillery, than in any other corps, is on account of the great variety in their duty, and, in an active campaign, being generally on detached duties, their ſervice being ſuch as requires levies from the infantry, to ſerve in them during the campaign, in order that in carrying on the operations againſt the enemy, a larger number of pieces of ordnance may be brought into the field: Therefore, the organization of the corps of artillery, as obſerved, requires a greater proportion of officers; and conſidering the expenſe they are to government, in reſpect to ordnance, and the expenditure of ammunition, in an operation againſt an enemy, it is requiſite that no piece of ordnance be detached without a commiſſioned officer to command, and a proportion of non-commiſſioned with it, as it is of the greateſt importance that the officer ſhould ſuperintend the direction of the piece to the object, in order that ſuch expenditure of ammunition ſhould have the deſired effect*.

In forming a company, and in filling up vacancies which may afterwards happen by caſualties, he ſhould be very cautious in the choice of his non-commiſſioned officers, that thereby the duty in the company may be performed with more agreeableneſs to both officers and ſoldiers, as a great deal depends on the conduct of the non-commiſſioned officers, in the diſcipline and duty of the company.

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* The king of Pruſſia ordered, at the battle of Molwitz, that, "The captains and lieutenants of "artillery ſhall point the guns themſelves, and not "truſt it to the gunners."

They ſhould be men of ſober life and converſation, brave and prudent, as abſolute in their command to inferiors, as ſubordinate to their ſuperiors; they ought to make themſelves acquainted with the different parts of their duty, and apply themſelves to it—to be equitable and juſt in their accounts—write a good hand, and endeavour to get a knowledge in ſome parts of the mathematics, as explained in the ſecond part, and underſtand accounts and details of duty, by which qualifications, they will be able to fill any military ſtation they may merit.

CHAP. II.

Of arms and accoutrements neceſſary for a ſoldier to carry in the Artillery.

THE artillery-men, in ſome ſervices, carry muſkets, or carbines and their accoutrements. The equipping artillery-men with fire-arms, accoutrements, *&c.* ſhews a degree of impropriety, which muſt be obvious to any perſon, who is any wiſe acquainted with the ſervice and duty of the artillery: The inconvenience attending which is, their being incumbered, when exerciſing field pieces.

The moſt that can be ſaid in favor of their carrying muſkets, *&c.* is, that when in battle, and on a cloſe charge of the enemy, they may be under the diſagreeable neceſſity of ſurrendering their pieces of artillery; after which they may be able to defend themſelves with their ſmall arms, and in camp to do their guard duties.

In order to obviate this, the artillery-men, when exerciſing with pieces of ordnance, are not only incumbered with ſmall arms and their accoutrements, *&c.* but alſo with the neceſſary apparatus of the pieces of artillery, which will naturally deſtroy that activity which is neceſſary in the various fatiguing parts of their duty in action; and as no officer can be juſtified in leaving his pieces, as long as the men have room to handle their implements, to load and fire. After which they will have but very little time to unſling their muſkets and load for defence; and to have them previouſly loaded, and the bayonets fixed, would expoſe the men to fatal accidents.

Experience hath informed us that arming the artillery with fire-arms, to be carried into the field, hath anſwered very little purpoſe.

Therefore, I would ſubſtitute, inſtead of fire-arms, for the artillery, *broad-ſwords*, and that the officers and ſoldiers be taught the proper uſe of them, being a lighter carriage than muſkets and their accoutrements, and will not impede that activity which is neceſſary in handling the implements of the pieces of ordnance*, and their movements; and on a cloſe contact with the enemy, where their pieces could not be of any further uſe, the *broad-ſword* will be the beſt reſource. The advantages are great in a deſperate conflict with an enemy. We have inſtances recorded in former wars, where the *ſword* was of great utility in ſimilar circumſtances, and made conſiderable havock of their enemy, and extricated themſelves.

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* The ſword is to be flung in a ſhoulder-belt, the ſtrap three inches wide, colored white, by cutting a

In actual ſervice three carbines or muſkets, &c. might be allowed to a company, for the regularity of camp duty, in mounting guards, which would be ſufficient to compleat as large a guard as is generally mounted by the artillery.

The new guard ſhould every morning go through the *manual exerciſe*, at leaſt half an hour, before they march off from the parade, ſo as to be acquainted with this part of duty.

The officers commanding companies are to be reſponſible that the ſmall-arms be kept in the moſt perfect order for ſervice.

Before I conclude this chapter, it will not be amiſs to give an extract of the late law of the United States, eſtabliſhing an uniform militia—wherein they require the companies of artillery to be equipped with fire-arms and accoutrements, &c. until proper ordnance, and field artillery is provided.

The officers to be armed with a ſword or hanger, a fuſee, bayonet and belt, with a cartridge box to contain twelve cartridges: and each private or ma-

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ſmall ſlit in the back part of the belt, ſo as to hitch on the hip button of the coat, which will confine it ſo as not to interfere in performing the exerciſe.

troſs, ſhall furniſh himſelf with all the equipments of a private in the infantry; *viz.* with a good muſket or fire-lock, a ſufficient bayonet and belt, two ſpare flints and a knapſack, a pouch with a box therein, to contain not leſs than twenty-four cartridges, ſuited to the bore of his muſket or fire-lock, each cartridge to contain a proper quantity of powder and ball; or with a good rifle, knapſack, ſhot-pouch and powder horn, twenty balls ſuited to the bore of his rifle and a quarter of a pound of powder, and ſhall appear ſo armed, accoutred and provided, when called out to exerciſe or into ſervice, except when called out on company days to exerciſe only, he may appear without a knapſack. And after five years from the paſſing of this act, all muſkets for arming the militia, as is herein required, ſhall be of bores ſufficient for balls of the eighteenth part of a pound; and every citizen ſo inrolled, and providing himſelf with the arms, ammunition and accoutrements required, as aforeſaid, ſhall hold the ſame, exempted from all ſuits, diſtreſſes, executions or ſales for debt, or for the payment of taxes.

Much more might be ſuggeſted on this ſubject, but it muſt be evident to every perſon who has any acquaintance with military diſcipline, that the variety which is contained in the duty of an artilleriſt, will engroſs every leiſure ſpace of time in gaining ſuch a proficiency in the various parts of duty, as will anſwer the expectations of government, in the eſtabliſhment of the corps of artillery.

CHAP. III.

Some Obſervations on the Nature of Military Diſcipline.

As there are many authors who have largely treated on this part of *tactics*, I will be brief on this head.

Military diſcipline may properly be called the ſoul of all armies; and, unleſs it be eſtabliſhed amongſt them with great prudence, and ſupported with determined reſolution, an army is not better than a mob or rabble, which is more to be feared by the community that ſupports it, than its declared enemies.

A due ſubordination, and an implicit obedience to ſuperiors, is no debaſement of a man's courage. An army well diſciplined, may, with propriety, be compared to a well conſtructed mechanical machine; conſiſting of a variety of parts, revolving within their reſpective ſpheres, and combining in the operation of its various powers, which will enable it to anſwer the purpoſes of its conſtruction—even ſo, where there is ſtrict diſcipline, and every officer and ſoldier is acquainted with the duties of his reſpective ſtation; their movements will be regular and mechanical, and will be powerful in their operations.

In order to arrive at this attainment, the officers ſhould make themſelves perfectly acquainted with the various parts of their duty, and chearfully attend ſtrictly to all orders, and every minute part of duty, which will inſpire the ſoldiers with a chearful compliance in doing their duty, when they ſee their officers ſet the example.

There are three requiſites of which an officer ought to be poſſeſſed. The firſt of which is *courage*, which is very eſſential in all orders of mankind, but more eſpecially in a military man, and without which the other properties will be rendered uſeleſs. The ſecond is *genius*, which muſt be ſtrong, and fertile in expedients: A military life opens a very large field for the exerciſe of this qualification of the mind, in taking every advantage of the ſituation of his enemy, by the various ſtratagems uſed in the art of war, either in defenſive or offenſive operations. And the third, which is the greateſt of all bleſſings, that is *health*, which will enable him to go through all the hardſhips incident to a military life, with pleaſure—Being endowed with theſe bleſſings, by a ſuitable application, he may anſwer all the purpoſes his country have a right to expect of him, in a military line of duty.

The moſt effectual method of ſupporting diſcipline in an army, is by the commanding officer iſſuing but few orders, and ſeeing that they are ſtrictly executed with attention, and all offences ought to be puniſhed, without diſtinction of rank or extraction.

Partiality muſt be entirely aboliſhed, otherwiſe the officer will expoſe himſelf to hatred and reſentment.

By his enforcing the authority with judgment, and ſetting a proper example, he may render himſelf at once both beloved and feared; and in order to obtain this affection, the officer is firſt to teach the ſoldier his duty, and in ſickneſs, or diſtreſs to endeavor to adminiſter every comfort that the circumſtances of his ſituation will admit; and never to order a ſoldier to do any thing but what is conſiſtent in the line of military duty, in diſobedience thereof, the officer is bound in duty to puniſh.

But (as Mr. Simes very juſtly obſerves) that ſeverity muſt be accompanied with great tenderneſs and moderation, when diſplayed upon every occaſion, it muſt appear void of all manner of deſign, and totally the effect of a natural diſpoſition.

The officers ſhould inſtil into the heart of ſoldiers, that obedience is the foundation of regularity and order—that by this, diſcipline is maintained—by this, great deſigns are executed; and without it, all will become a ſcene of confuſion and diſorder.

As obedience is requiſite in all grades of officers, it is equally ſo in a ſoldier, who ſhould be brave, vigorous, careful, and obedient to the orders of his ſuperior officers, from the commander in chief, down to the corporal; and obey the orders of the latter, as if coming from the mouth of the former; as in reality they do. He ſhould take care of his uniform as well as his other cloathing, to keep it neat and clean, as alſo his arms and accoutrements in the moſt perfect order; and the uſe of which he ought diligently to ſtudy, as all his different duties.

He ſhould be acquainted with all the beats of the drum and the tunes of the fife, and inſtantly to obey them: A ſoldier ought to have a muſical ear, which will enable him to march at eaſe, and with his feet to keep proper time with the muſic.

The exertions of an army depend on their health, therefore, cleanlineſs in cooking their proviſions, and the mode that is neceſſary for their health, to which the officers ſhould be very attentive, as in civil life very few men have occaſion to undertake this part of economy, being generally ſo connected with the female ſex, that they are exempted from it.

In all armies there are a great variety of geniuſes which compoſe it: Some men are naturally very alert and active, and will perform their duty with chearfulneſs on all occaſions; while others will be like the ſluggard, loath to do their duty, and will pretend ſickneſs to avoid their ordinary duties.

How unfit ſuch men as theſe are for a military life, may be eaſily imagined: How will they merit contempt and puniſhment? Soldiers are to underſtand, that conſtant and regular exerciſe, is as neceſſary for their health, as for their inſtruction, and that an army of men undiſciplined, untaught and unuſed to any fatigue, is an eaſy prey to people trained in arms, and brought up to the exerciſe of war.

It is the diſtinguiſhed character of a good ſoldier, to go through every part of his duty with chearfulneſs, reſolution and obedience.

CHAP. IV.

Of the inſtruction of recruits, and the manual exerciſe with fire-locks or fuſees.

According to a late law of the United States, eſtabliſhing an uniform militia—requiring that the artillery-men be equipped with fire-locks, *&c.* it will be neceſſary, in this chapter, to inſert the manual exerciſe, for their benefit, agreeable to baron Steuben's regulations of diſcipline.

The commanding officer of each company is charged with the inſtruction of his recruits; and as that is a ſervice which requires not only experience, but patience, a temper not met with in every officer, he is to make choice of an officer, ſerjeant and one or two corporals of his company, who, being approved of by the colonel, are to attend particularly to that buſineſs; but in caſe of the arrival of a great number of recruits, every officer, without diſtinction, is to be employed on that ſervice.

The commanding officer of each regiment will fix on ſome place for the exerciſe of his recruits, where himſelf or ſome field-officer muſt attend, to overlook their inſtruction.

The recruits muſt be taken ſingly, and firſt taught to put on their accoutrements, and carry themſelves properly.

The poſition of a ſoldier without arms.

He is to ſtand ſtraight and firm upon his legs, with the head turned to the right, ſo far as to bring the left eye over the waiſtcoat buttons; the heels two inches a part; the toes turned out; the belly drawn in a little, but without conſtraint; the breaſt a little projected: the ſhoulders ſquare to the front and kept back—and the hands hanging down the ſides, with the palms cloſe to the thighs.

Attention!

At this word the ſoldier muſt be ſilent, ſtand firm and ſteady, moving neither hand nor foot (except as ordered) but attend carefully to the words of command.

This attention of the ſoldier's muſt be obſerved in the ſtricteſt manner, till he receives the word,

Reſt!

At which he muſt refreſh himſelf, by moving his hands or feet; but muſt not then ſit down, or quit his place, unleſs permitted ſo to do.

Attention!

To the left,—Dreſs!

At this word the ſoldier turns his head briſkly to the left, ſo as to bring his right eye in the direction of his waiſtcoat buttons.

To the right,—Dreſs!

The ſoldier dreſſes again to the right, as before.

The recruits muſt then be taught,

The facings.

To the right,—Face! *Two motions.*

1ſt. Turn briſkly on both heels to the right, lifting up the toes a little, and deſcribing the quarter of a circle.

2d. Bring back the right foot to its proper poſition.

To the left,—Face! *Two motions.*

1ſt. Turn to the left as before to the right.

2d. Bring up the right foot to its proper poſition.

To the right about,—Face! *Three motions.*

1ſt. Step back with the right foot, bringing the buckle oppoſite the left heel, at the ſame time ſeizing the cartridge-box with the right hand.

2d. Turn briſkly on both heels, and deſcribe half a circle.

3d. Bring back the right foot, at the ſame time quitting the cartridge-box.

When the recruit is ſufficiently expert in the foregoing points, he muſt be taught the different ſteps.

The Common ſtep

Is two feet, and about ſeventy-five in a minute.

To the front,—March!

The ſoldier ſteps off with his left foot, and marches a free, eaſy and natural ſtep, without altering the poſition of his body or head, taking care to preſerve a proper balance, and not croſs his legs, but to march without conſtraint, in every ſort of ground: The officer muſt march ſometimes in his front and ſometimes at his ſide, in order to join example to precept.

Halt!

At this word the ſoldier ſtops ſhort, on the foot then advanced, immediately bringing up the other without ſtamping.

The quick ſtep

Is alſo two feet, but about one hundred and twenty in a minute, and is performed on the ſame principles as the other.

The recruits having been exerciſed ſingly, till they have a proper carriage, and are well grounded in the different ſteps; the officer will then take three men, and placing them in one rank, exerciſe them in the different ſteps, and teach them

The march by files,

Which, being of great importance, muſt be carefully attended to; obſerving that the ſoldier carries his body more forward than in the front march, and that he does not increaſe the diſtance from his file-leader.

The oblique ſtep

Muſt then be practiſed, both in the quick and common time.

In marching obliquely to the right, the ſoldier ſteps obliquely with the right foot, bringing up the left, and placing the heel directly before the toes of the right foot, and the contrary when marching to the left; at the ſame time, obſerving to keep the ſhoulders ſquare to front, eſpecially that the ſhoulder oppoſed to the ſide they march to does not project, and that the files keep cloſe.

The recruits being thus far inſtructed, muſt be again taken ſeparately, and taught

The poſition of a ſoldier under arms.

In this poſition the ſoldier is to ſtand ſtraight and firm upon his legs, with the heels two inches apart, the toes a little turned out; the belly drawn in a little without conſtraint, the breaſt a little projected, the ſhoulders ſquare to the front and kept back, the right hand hanging down the ſide with the palm cloſe to the thigh, the left elbow not turned out from the body, the fire-lock carried on the left ſhoulder, at ſuch height that the guard will be juſt under the left breaſt, the fore-finger and thumb before the ſwell of the butt, the three laſt fingers under the butt, the flat of the butt againſt the hip bone, and preſſed ſo as that the fire lock may be felt againſt the left-ſide; and ſtand before the hollow of the ſhoulder, neither leaning towards the head nor from it, the barrel almoſt perpendicular.

When exerciſing, he is to be very exact in counting a ſecond of time between each motion.

The manual exerciſe with fire-locks.

I.

Poiſe—fire-lock! *Two motions.*

1ſt. With your left hand turn the fire-lock briſkly, bringing the lock to the front, at the ſame inſtant ſeize it with the right hand juſt below the lock, keeping the piece perpendicular.

2d. With a quick motion, bring up the fire lock from the ſhoulder directly before the face, and ſeize it with the left, juſt above the lock, ſo that the little finger may reſt upon the feather-ſpring, and the thumb lie on the ſtock; the left hand muſt be of an equal height with the eyes.

II.

Cock—fire-lock! *Two motions.*

1ſt. Turn the barrel oppoſite to your face, and place your thumb upon the cock, raiſing the elbow ſquare at this motion.

2d. Cock the fire-lock by drawing down your elbow, immediately placing your thumb upon the breech pin, and the fingers under the guard.

III.

Take aim! *One motion.*

Step back about ſix inches with the right foot, bringing the left toe to the front; at the ſame time drop the muzzle, and bring up the butt end of the fire-lock againſt your right ſhoulder; place the left hand forward on the ſwell of the ſtock, and the fore finger of the right hand before the trigger; ſinking the muzzle a little below a level, and with the right eye looking along the barrel.

IV.

Fire! *One motion.*

Pull the trigger briſkly, and immediately after bringing up the right foot, come to the priming poſition, placing the heels even, with the right toe pointing to the right, the lock oppoſite to the right breaſt, the muzzle directly to the front and as high as the hat, the left hand juſt forward of the feather-ſpring, holding the piece firm and ſteady; and at the ſame time ſeize the cock with the fore finger and thumb of the right hand, the back of the hand turned up.

V.

Half-cock—fire-lock! *One motion.*

Half bend the cock; briſkly bringing down the elbow to the butt of the fire-lock.

VI.

Handle—cartridge! *One motion.*

Bring your right hand ſhort round to your pouch, ſlapping it hard, ſeize the cartridge, and bring it with a quick motion to your mouth, bite the top off down to the powder, covering it inſtantly with your thumb, and bring the hand as low as the chin, with the elbow down.

VII.

Prime! *One motion.*

Shake the powder into the pan, and covering the cartridge again, place the three laſt fingers behind the hammer, with the elbow up.

VIII.

Shut—pan! *Two motions.*

1ſt. Shut your pan briſkly, bringing down the elbow to the butt of the fire-lock, holding the cartridge faſt in your hand.

2d. Turn the piece nimbly round before you to the loading poſition, with the lock to the front, and the muzzle at the height of the chin, bringing the right hand up under the muzzle; both feet being kept faſt in this motion.

IX.

Charge with cartridge! *Two motions.*

1ſt. Turn up your hand, and put the cartridge into the muzzle, ſhaking the powder into the barrel.

2d. Turning the ſtock a little towards you, place your right hand cloſed, with a quick and ſtrong motion upon the butt of the rammer, the thumb upwards, and the elbow down.

X.

Draw—rammer! *Two motions.*

1ſt. Draw your rammer with a quick motion half out, ſeize it inſtantly at the muzzle, back-handed.

2d. Draw it quite out, turn it, and enter it into the muzzle.

XI.

Ram down—cartridge! *One motion.*

Ram the cartridge well down the barrel, and inſtantly recovering and ſeizing the rammer back-handed by the middle, draw it quite out, turn it, and enter it as far as the lower pipe, placing at the ſame time the edge of the hand on the butt-end of the rammer, with the fingers extended.

XII.

Return—rammer! *One motion.*

Thruſt the rammer home, and inſtantly bring up the piece with the left hand to the ſhoulder, ſeizing it at the ſame time with the right hand under the cock, keeping the left hand at the ſwell, and turning the body ſquare to the front.

XIII.

Shoulder—fire-lock! *Two motions.*

1ſt. Bring down the left hand, placing it ſtrong upon the butt.

2d. With a quick motion bring the right hand down by your ſide.

XIV.

Order—fire-lock! *Two motions.*

1ſt. Sink the fire-lock with the left hand as low as poſſible, without conſtraint, and at the ſame time bring up the right hand, ſeize the fire-lock at the left ſhoulder.

2d. Quit the fire-lock with the left hand, and with the right bring it down the right ſide, the butt on the ground, even with the toes of the right foot, the the thumb of the right hand lying along the barrel, and the muzzle being kept at a little diſtance from the body.

XV.

Ground—fire-lock! *Two motions.*

1ſt. With the right hand turn the fire-lock, bringing the lock to the rear, and inſtantly ſtepping forward with the left foot, a large pace, lay the piece on the ground, the barrel in a direct line from front to rear, placing the left hand on the knee, to ſupport the body, the head held up, the right hand and left heel in a line, and the right knee brought almoſt to the ground.

2d. Quitting the fire-lock, raiſe yourſelf up, and bring back the left foot to its former poſition.

XVI.

Take up—fire-lock! *Two motions.*

1ſt. Step forward with the left foot, ſink the body, and come to the poſition deſcribed in the firſt motion of grounding.

2d. Raiſe up yourſelf and fire-lock, ſtepping back again with the left foot, and as ſoon as the piece is perpendicular, turn the barrel behind, thus coming to the order.

XVII.

Shoulder—fire-lock! *Two motions.*

1ſt. Bring the fire-lock to the left ſhoulder, throwing it up a little, and catching it below the tail-pipe, and inſtantly ſeize it with the left hand at the butt.

2d. With a quick motion bring the right hand down by your ſide.

XVIII.

Secure—fire-lock! *Three motions.*

1ſt. Bring up the right hand briſkly, and place it under the cock.

2d. Quit the butt with the left hand, and ſeize the fire-lock at the ſwell, bringing the arm cloſe down upon the lock, the right hand being kept faſt in this motion, and the piece upright.

3d. Quitting the piece with your right hand, bring it down by your ſide, at the ſame time with your left hand, throw the muzzle directly forward, bringing it within about one foot of the ground, and the butt cloſe up behind the left ſhoulder, holding the left hand in a line with the waiſt belt, and with that arm covering the lock.

XIX.

Shoulder—fire-lock! *Three motions.*

1ſt. Bring the fire-lock up to the ſhoulder, ſeizing it with the right hand under the cock.

2d. Bring the left hand down ſtrong upon the butt.

3d. Bring the right hand down by your ſide.

XX.

Fix—bayonet! *Three motions.*

1ſt. And 2d. motion the ſame as the two firſt motions of the ſecure.

3d. Quitting the piece with your right hand, ſink it with your left down the left ſide, as far as may be without conſtraint, at the ſame time ſeize the bayonet with the right hand, draw and fix it, immediately ſlipping the hand down to the ſtock, and preſſing in the piece to the hollow of the ſhoulder.

XXI.

Shoulder—fire-lock! *Three motions.*

1ſt. Quitting the piece with the right hand, with the left bring it up to the ſhoulder, and ſeize again with the right hand under the cock, as in the ſecond motion of ſecure.

2d. Bring the left hand down ſtrong upon the butt.

3d. Bring the right hand by your ſide.

XXII.

Preſent—arms! *Three motions.*

1ſt. And 2d. motion the ſame as in coming to the poiſe.

3d. Step briſkly back with your right foot, placing it a hand's breadth diſtant from your left heel, at the ſame time bring down the fire-lock as quick as poſſible to the reſt, ſinking it as far down before your left knee as your right hand will permit without conſtraint, holding the right hand under the guard, with the fingers extended, and drawing in the piece with the left hand, till the barrel is perpendicular; during this motion you quit the piece with the left hand, and inſtantly ſeize it again juſt below the tail-pipe.

XXIII.

Shoulder—fire-lock! *Two motions.*

1ſt. Lift up your right foot and place it by your left, at the ſame time bring the fire-lock to your left ſhoulder, and ſeize the butt end with the left hand, coming to the poſition of the motion of the ſecure.

2d. Bring the right hand down by your ſide.

XXIV.

Charge bayonet! *Two motions.*

1ſt. The ſame as the firſt motion of the ſecure.

2d. Bring the butt of the fire-lock under the right arm, letting it fall down ſtrong on the palm of the left hand, which receives it at the ſwell, the muzzle pointing directly to the front, the butt preſſed with the arm againſt the ſide; the front rank holding their pieces horizontally, and the rear rank the muzzles of theirs ſo high as to clear the heads of the front rank, both ranks keeping their feet faſt.

XXV.

Shoulder—fire-lock! *Two motions.*

1ſt. Bring up the piece ſmartly to a ſhoulder, ſeizing the butt with the left hand.

2d. Bring the right hand down by your ſide.

XXVI.

Advance—arms! *Four motions.*

1ſt. And 2d. The ſame as the two firſt motions of the poiſe.

3d. Bring the fire-lock down to the right ſide, with the right hand as low as it will admit without conſtraint, ſlipping up the left hand at the ſame time to the ſwell, and inſtantly ſhifting the poſition of the right hand, take the guard between the thumb and fore-finger, and bring the three laſt fingers under the cock, with the barrel to the rear.

4th. Quit the fire-lock with the left hand, bringing it down by your ſide.

XXVII.

Shoulder—fire-lock! *Four motions.*

1ſt. Bring up the left hand, and ſeize the fire-lock at the ſwell; ſhifting the right hand to its former poſition.

2d. Come ſmartly up to a poiſe.

3d. And 4th. Shoulder.

Explanation of priming and loading, as performed in the firings.

Prime & load! *Fifteen motions.*

1ſt. Come to the recover, throwing up your fire-lock, with a ſmart ſpring of the left hand, directly before the left breaſt, and turning the barrel inwards;

at that moment catch it with the right hand below the lock, and inſtantly bringing up the left hand with a rapid motion, ſeize the piece cloſe above the lock, the little finger touching the feather ſpring; the left hand to be at an equal height with the eyes, the butt of the fire-lock cloſe to the left breaſt, but not preſſed, and the barrel perpendicular.

2d. Bring the fire-lock down with a briſk motion to the *priming poſition*, as directed in the *fourth* word of command, inſtantly placing the thumb of the right hand againſt the face of the ſteel, the fingers clenched, and the elbow a little turned out, that the wriſt may be clear of the cock.

3d. Open the pan by throwing back the ſteel with a ſtrong motion of the right arm, keeping the fire-lock ſteady in the left hand.

4th. Handle cartridge.
5th. Prime.
6th. Shut pan.
7th. Caſt about.
8th. And 9th. Load.
10th. And 11th. Draw rammer.
12th. Ram down cartridge.
13th. Return rammer.
14th. And 15th. Shoulder.

Note—The motion of recover, coming down to the priming poſition, and opening the pan, to be done in the uſual time; the handling the cartridge to ſhutting the pan, to be done as quick as poſſible: When the pans are ſhut, make a ſmall pauſe, and caſt about together; then the loading and ſhouldering motions are to be done as quick as poſſible.

Poſition of each rank in the firings.

Front rank! Make ready! *One motion.*

Spring the fire-lock briſkly to a recover, as ſoon as the left hand ſeizes the fire-lock above the lock, the right elbow is to be nimbly raiſed a little, placing the thumb of that hand upon the cock, the fingers open by the plate of the lock, and as quick as poſſible cock the piece, by dropping the elbow, and forcing down the cock with the thumb, immediately ſeizing the fire-lock with the right hand, cloſe under the lock; the piece to be held in this manner perpendicular, oppoſite to the left ſide of the face, the body kept ſtraight, and as full to the front as poſſible, and the head held up, looking well to the right.

Take aim! Fire!

As before explained.

Rear rank! Make ready! *One motion.*

Recover and cock as before directed, at the ſame time ſtepping about ſix inches to the right, ſo as to place yourſelf oppoſite the interval of the front rank.

Take aim! Fire!

As before explained.

The recruits being thus far inſtructed, the officer muſt take twelve men, and placing them in one rank, teach them to dreſs to the right and left; to do which the ſoldier muſt obſerve to feel the man on that ſide he dreſſes to, without crowding him, and to advance or retire, till he can juſt diſcover the breaſt of the ſecond man from him, taking care not to ſtoop, but to keep his head and body upright.

When they can dreſs pretty well, they muſt be taught *to wheel,* as follows:

To the right—Wheel!

At this word of command the men turn their heads briſkly to the left, except the left hand man.

(Plate 3, Fig. 2.)

March!

The whole ſtep off, obſerving to feel the hand they wheel to, without crowding; the right hand man, ſerving as a point for the reſt to turn on, gains no ground, but turns on his heel; the officer will march on the flank, and when the wheeling is finiſhed, command,

Halt!

On which the whole ſtop ſhort on the foot then forward, bringing up the other foot, and dreſſing to the right.

To the left—Wheel!

The whole continue to look to the right, except the right hand man, who looks to the left.

March!

As before explained.

N. B. The wheelings muſt firſt be taught in the common ſtep, and then practiſed in the quick ſtep.

When the recruits have practiſed the foregoing exerciſe, till they are ſufficiently expert, they muſt be ſent to exerciſe with their company.

CHAP. V.

THE EXERCISE OF A COMPANY WITH FIRE-LOCKS.

ARTICLE I.

Of opening the ranks.

Rear rank ! Take—Diſtance ! March !

(*Plate* 1. *Fig.* 2*.)

THE rear rank ſteps back four paces, and dreſſes by the right: the officers at the ſame time advancing eight paces to the front, and dreſſing in a line: the ſerjeants who cover the officers, take their places in the front rank; the non-commiſſioned officers who are in the rear, remain there, ſtepping back four paces behind the rear rank.

Rear rank ! Cloſe to the front !

The officers face to the company.

March !

The rear rank cloſes to within a common pace, or two feet; and the officers return to their former poſts.

Plate 3, *Fig.* 1.

ART. II.

Of the firings.

The captain will divide his company into two or more ſections, and teach them the fire by platoons, as directed in Chap. 18, Art. 1, 2.

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* Exerciſing with fire-locks, the commiſſioned officers will be poſted as *Plate* 3, *Fig.* 1. and advance as above directed.

The officers muſt give the words of command with a loud and diſtinct voice; obſerve that the ſoldiers ſtep off, and place their feet as directed in the manual exerciſe; and that they level their pieces at a proper height; for which purpoſe they muſt be accuſtomed always to take ſight at ſome object.

The officer will often command, *As you were!* to accuſtom the ſoldier not to fire till he receives the word of command.

In all exerciſes in detail, the men will uſe a piece of wood, inſtead of a flint; and each ſoldier ſhould have ſix pieces of wood, in the form of cartridges, which the ſerjeants muſt ſee taken out of the piece when the exerciſe is finiſhed.

When the company exerciſe with powder, the captain will inſpect the company, and ſee that all the cartridges not uſed are returned.

ART. III.

Of the march.

In *marching to the front* the men muſt be accuſtomed to dreſs to the center, which they will have to do when exerciſing in battalion; and for this purpoſe, a ſerjeant muſt be placed ſix paces in front of the center, who will take ſome object in front of the center to ſerve as a direction for him to march ſtraight forwards; and the men muſt look inwards, and regulate their march by him.

The captain muſt exerciſe his company in different ſorts of ground; and when, by the badneſs of the ground, or any other accident, the ſoldier loſes his ſtep, he muſt immediately take it again from the ſerjeant in the center.

The officers muſt not ſuffer the leaſt inattention, but puniſh every man guilty of it.

The oblique march,

Muſt be practiſed both in the quick and common ſtep, agreeably to the inſtructions already given.

The march by files

Is as important as difficult. In performing it, the officers muſt be attentive that the ſoldiers bend their bodies a little forward, and do not open their files.

The leading file will be conducted by the officer; who will poſt himſelf for that purpoſe on the left, when they march by the right, and the contrary when they march by the left.

The counter march.

Note. This march muſt never be executed by larger portions of a battalion than platoons.

Caution.

Take care to counter march from the right, by platoons!

To the right—face! March!

The whole facing to the right, each platoon wheels by files to the right about; and when the right file gets on the ground where the left ſtood, the officer orders,

Halt! to the left—Face!

And the company will be formed with their front changed.

ART. IV.

Of wheeling.

Plate 3, *Figure* 2.

The captain will exerciſe his company in wheeling entire, and by ſections or platoons, both in the common and quick ſtep, taking care that the men in the rear rank incline a little to the right or left, according to the hand they wheel to, ſo as always to cover exactly their file leaders.

ART. V.

Of breaking off, and forming by the oblique ſtep.

The captain having divided his company into two ſections, will give the word,

Sections! Break off!

Upon which the ſection on the right inclines by the oblique ſtep to the left, and that on the left, following the former, inclines to the right, till they cover each other, when they march forward.

Form company!

The firſt ſection inclines to the right, ſhortening its ſteps, and the ſecond to the left, lengthening its ſtep, till they are uncovered, when both march forward and form a line.

Two or more companies may be joined to perform the company exerciſe, when they have been ſufficiently exerciſed by ſingle companies, but not till then; the inattention of the ſoldiers, and difficulty of inſtructing them, increaſing in proportion with the numbers.

CHAP. VI.

OF THE MANUAL EXERCISE OF FIELD ARTILLERY.

EVERY artilleriſt in learning his exerciſe, muſt give the greateſt attention to the words of command, the beats of the drum, and the different poſitions in which his body ſhould be placed.

In the firſt place, it is neceſſary that the young artilleriſt ſhould be acquainted with the names of the apparatus, which is neceſſary to equip a piece of artillery in the field, *viz.* 1ſt. A lint-ſtock, 2d. A port-fire-ſtock, 3d. A powder-horn and hammer, pincers, priming wyers and gimblets; theſe are fixed in the gunners belt: 4th. A tube-box and thumb-caſe; this is made of leather, which the bombardier puts on his left thumb, to prevent the heat of the piece, in quick firing, from burning him: 5th. A haverſack, 6th. A ſpunge and rammer, 7th. A ladle, 8th. A worm; ſometimes the ladle and worm are fixed on one ſtaff: 9th. A ſett of drag ropes, 10th. A trail-ſpike, to guide the piece with, or tiller, which is a more ſuitable term for it, as the gunner ſteers the piece with it; and I ſhall apply this term, *tiller*, throughout the following treatiſe.

Alſo, limbers, gears, horſes, *&c.*

I ſhall divide the exerciſe under the following *Articles*: 1ſt. The gunners duty, who directs the piece to the object aimed at.

Art. 2d. The gunner's duty who fires the piece off.

Art. 3d. The bombardier's duty who tends the vent.
4th. The gunner's duty who handles the ſpunge and rams down the charge.
5th. The gunner's duty who handles the cartridge, or charges the piece.
6th. The matroſs's duty who carries the haverſack.
7th. The matroſs's duty who man's the dragropes.
8th. The matroſs's duty who carries the ſideboxes of the pieces.
9th. The words of command.

ARTICLE I.

The duty of a gunner is very extenſive. He ought to underſtand ſeveral branches of the mathematics, as geometry, trigonometry, and have ſome idea of natural philoſophy.

But as the theoretical part of gunnery cannot always be conveniently uſed in field duty, and it would open a field too extenſive for my preſent deſign in this part: I, therefore, ſhall confine myſelf to the practical part.

A gunner ought to be a man of good judgment, acquainted with heights and diſtances, ſo that in the different ſituations of the ground on which he may be poſted, he may be able to form a judgment what elevation or depreſſion will be requiſite to hit the object aimed at. He ought, alſo, to be well acquainted with the ſtrength and quality of powder, ſo as to know what quantity is ſufficient for a charge.

Poſition 1ſt.

The gunner who directs the piece is the moſt proper perſon to guide it by the tiller* on advancing or retreating, always having your eye on the commanding officer of the piece, ſo as to incline to the right or left, as he ſhall direct. When you have orders to load and fire, which is generally by the drummer's beating a preparative, you are to ſtep your right foot in the trail of the carriage. In this poſition you are able to take your line of direction to the object, by placing your two thumb-nails together on the center line, or horizontal ſurface; which is produced by letting fall a perpendicular both at breech and muzzle, that perpendicular, mark on the breech and muzzle, which terminates the center line; and looking through between the end of your two thumb-nails, ranging the center line with the object which gives the center line of direction.

Poſition 2d.

Then take your obſervation on the ſide lines; theſe ſide lines are a right line biſecting the perpendicular in the center of the cylinder's diameter at right angles, which enables you to know whether your piece wants elevation or depreſſion, according to the diſtance and ſituation of the object aimed at.

Poſition 3d.

Then retiring to your poſt on the left of the tiller, ſo as to guide the piece when it moves, always obſerving, when the word of command is given to fire, ſtep obliquely to the left, ſo far as to be clear of the carriage when it recoils, and ſtand ſtraight, with your body ſquare to the front.

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* Some officers poſt a gunner on purpoſe to direct the piece to the object, but I think it is unneceſſary, as a commiſſioned officer ought always to inſpect the direction of the piece after the gunner.

ART. II.

The gunner who fires the piece off, ought to be very cautious, not to fire until he receives orders from the commanding officer of the piece.

The apparatus which he carries conſiſts of a lintſtock and portfire-ſtock, which are occaſionally fixed in his ſhoulder-belt, made for that purpoſe.

Poſition 1ſt.

You ſtand on the left ſide of the piece, your left foot about right angles with the vent, (or touch-hole) of the piece, and ſo as to be clear of the wheel when the piece recoils.

Poſition 2d.

Make a half pace to the right, ſtep with your right foot a moderate ſtep to the right.

Poſition 3d.

If firing with ſlow-match, hold the lint-ſtock in your right hand, extending your arm downwards;

Gen. KNOX favored me with a manuſcript in French, wrote by lieut. col. NADAL, director of the park of artillery, commanded by col. D'ABOVELLE, under the orders of his excellency, lieut. gen. count DE ROCHAMBEAU, 1781, which I ſhall here introduce, in the form of notes, for the benefit of the young artilleriſt, who is deſirous of a knowledge of the practice of other nations.

and when you fire bring up the lint-ſtock, forming a ſemi-circle—which anſwers inſtead of blowing the match, and looks more graceful. At the ſame time bring up your right foot, placing the heel to the hollow of your left foot.

Poſition 4th.

But if firing with portfires, you may carry the lint-ſtock on your left arm, and the portfire-ſtock in the right hand, depreſſed—There is no need of taking a ſweep with it, as the ſparks or drops of burning compoſition would burn the men. Bring it up moderately to the piece.

Poſition 5th.

When fired, ſtep back with your right foot—being as poſition firſt.

Poſition 6th.

On a march you are to carry the lint-ſtock on your left arm; the portfire-ſtock may be fixed in the belt; and bring up your right foot, and face to the left—and on a retreat face to the right.

ART. III.

A bombardier's duty is very extenſive; he ought to be a man of good judgment, and endeavour to be well acquainted with compoſitions and fire-works of all ſorts, and mortar practice.

In exerciſing field pieces, a bombardier is generally poſted to tend the vent; in this piece of duty

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The ſervice of a field-piece, whoſe caliber is a four pounder, managed by eight artillery men.

Poſition of the men at the left of the piece.

2d Cannonier's duty—On advancing he holds the left trail ſpike or lever with his right hand, and on retreating he holds it with his left hand.

he ought to be very careful in tending the vent, as it is a very eſſential part of the exerciſe in action.

Poſition 1ſt.

Make a half face to the left, ſtep with your left foot a moderate ſtep obliquely to the left; with your left toes turned outwards.

2d. When the piece is fired, bring up your left foot a moderate ſtep, in front of your right foot, with the toes turned a little outwards.

3d. At the ſame time you ſtep forward with your right foot, you raiſe the left to the breech of the piece, with the fingers extended on the breech moulding, and your thumb on the vent, (or touch hole) placed ſo as to prevent any air coming out; your thumb is to be kept in this poſition, till the piece is ſpunged, and the charge rammed home.

4th. If firing with tubes, your right hand at the ſame time in the tube box, place the tube between your fore and middle finger, with the pen part of the tube towards the muzzle of the piece; and the right thumb on the cap of the tube.

During the action he ſtands in a line with the breech of the piece. 1ſt. At the order of charge, he ſtops the vent, (or touch hole) with his left hand: 2d. And with his right hand gives the proper elevation of the piece to hit the object.

Servants, or men ſerving the piece.

1ſt. Servant or man *has a ſhoulder belt with a rope or thong, with an eye at one end, and the other fixed to the belt, and hangs on his right ſide, in advancing he*

5th. As ſoon as the charge is rammed home, draw your left thumb off the vent, and with the right hand put the tube into the vent, preſſing it down till it enters the cartridge in the cylinder (or chamber) of the piece.

6th. If firing with paper cartridges, as ſoon as the cartridge is rammed home, ſeize the priming-wire with your right hand, and extending it to the vent, enter it in and prick the cartridge, then return it back to the caſe in the belt.

7th. Pull out the ſtopper of the powder-horn, ſeize it with your right hand, extend the right hand with the fore finger over the top of the horn, ſo as to prevent the powder from running out of the horn.

8th. Prime, draw back your left thumb off the vent, and prime; then break the kernels of powder by rolling the horn on the priming, which cauſes it to catch fire quicker.

9th. Then cover the priming with the hollow of

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hitches it on the breaſt tranſom hook at the head of the carriage, and on retreating to the waſher hook. He carries the haverſack, which hangs on his left ſide; he is purveyor of the piece. During the action he ſtands on the left of the wheels, at the order charge, *he ſteps towards the muzzle of the piece, by moving himſelf in a reverſe manner to that of the firſt ſervant on the right of the piece, who carries the ſpunge, and after the piece is ſpunged, he puts the cartridge into the cylinder of the piece. When his haverſack is empty, he goes to the ammunition boxes and repleniſhes it.*

your left hand, ſo that it may not blow off by the wind.

10th. When the word is given to fire, bring down your left hand to the ſide of your thigh; at the ſame time ſtep back with the left foot, as poſition firſt;—the right foot is to be placed ſo as to be clear of the wheel when the gun recoils.

11th. When the march is beat, bring up the left foot and face to the right—when a retreat, bring up the left foot and face to the left.

ART. IV.

The gunner's duty who ſpunges and rams down the charge. This part of exerciſe is very eſſential, and therefore ought to be done with punctuality and coolneſs.

Poſition 1ſt.

You are poſted on the right ſide of the piece, between the wheel and the muzzle of the gun, with

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2d. Servant or man *hath a ſhoulder belt and ſhort drag rope, as above deſcribed, hanging on his right ſide, and a tube box or pouch, fixed on a waiſt belt, before him; and the priming wire fixed in it. On advancing he hooks his drag rope to the waſher hook, and in retreating he hitches it on the trail tranſom hook.*

During the action he ſtands in a line with the breech of the piece, on the left of the 2d. cannonier: he ſteps forward with his left foot towards the piece: after the cannonier hath left it, he cleans the vent with his right hand, and primes with his left hand; and then retires to his poſt; he then beckons to the 2d. ſervant on the right of the piece, to fire.

your body ſquare to the front, and ſo far back as to be clear of the muzzle of the piece, when fired.

2d. Your left foot a moderate pace in front, the toes turned outwards.

3d. Place your ſpunge oppoſite to your right breaſt, and right hand extended downwards,—Seize the ſtaff juſt above the rammer head, with the back of your hand to the front, and fingers extended downwards;—And with your left hand ſeize the ſtaff oppoſite to the right breaſt, with the back of the hand to the front, and your left elbow turned a little up holding the ſpunge perpendicular.

4th. Step your right foot in front of the left a moderate ſtep, making a ſwivel on the ball of your left foot; at the ſame time face to the left.

5th. At the ſame time you face, bring down the

3d. Servant or man, *hath a haverſack hanging on his left ſide, on the piece advancing he places himſelf between the two cannoniers, at the trail ſpike or lever, to help them, and on retreating he goes to the muzzle of the piece and aſſiſts in puſhing it.*

During the action he aſſiſts the firſt ſervant in ſerving the piece with cartridges alternately, when the haverſacks want repleniſhing.

Poſition of the men on the right of the piece.

1ſt. Cannonier's duty. *On the piece advancing, he is on the right of the right trail ſpike, or lever, which he holds with both hands, and on retreating he holds it with his right hand.*

ſpunge on the right ſide of the muzzle of the gun, ſlipping the left hand to the head of the ſpunge—the back of it downwards. Enter the ſpunge in the cylinder.

6th. Then drop your left hand on your left thigh, puſhing the ſpunge into the cylinder of the piece with the right hand till the ſpunge touches the head of the cylinder, turn it once and a half round or more.

7th. Draw the ſpunge out with your right hand, the back of it downwards; and turn it over fliping the right hand up to the ſpunge, the back of the hand being downwards; ſlip the left hand to the rammer head, the back of your left uppermoſt, and the fingers extended to the head of the rammer,—Enter it into the cylinder of the piece, quit your left hand, and bring it up to your right hand, ſink your body down a little, fling your left hand back at the ſame time, ram down the charge, keeping your body clear

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During the action he ſtands between the two trail ſpikes or levers; he takes care that the 2d. cannonier and all the ſervants are at their poſts, and gives the only orders to charge; *he levels the piece to the object, while they load it; he goes backwards before the fire is put to the piece, by the right or the left, according to the courſe of the wind, in order to obſerve the ſhot.*

Servants, or men ſerving the piece.

1ſt. Servant or man's duty. *He carries the ſpunge and hath his ſhort drag rope hanging on his left ſide, on the piece advancing he hitches it on the breaſt tranſom* of the muzzle on account of accidents : ſinking your body, brings you more on a level with the cylinder, and ſlinging the left hand back gives a greater force in ramming down the charge.

8th. Spring the rammer out of the cylinder with your right hand, ſtriking the rammer head with the palm of your left hand, (is in order to poize it, ſo that it may be brought to an advance more eaſily without ſtraining your right hand, and as a check when the rammer ſprings out of the cylinder,) bring it to advance, as poſition 3d. at the ſame time, bring back your right foot a moderate ſtep to the rear of the left foot, toes turned out, turning on the ball of your left foot, (which is not to be taken off the ground where it was firſt placed, only ſwivelling on the ball of the foot, except in long pieces where it will be neceſſary to make a ſtep,) which brings you as poſition 2d. and 3d.

9th. In advancing, you are to advance as poſition 1ſt. but if you advance very faſt, you muſt carry the ſpunge ſloped on your right ſhoulder holding it with

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hook, on the right of the carriage, and when retreating, on the waſher hook. During the action he ſtands a little forward on the right of the wheel, and holds his ſpunge horizontally with both of his hands. At the order charge, *he goes to the muzzle of the piece, making a long ſtep with his left foot, placing his right foot in a parallel poſition with the piece, and the heels* 18 *inches apart. He ſpunges the piece and then rams the cartridge home with his rammer, and then retires on his right foot to his firſt poſition.*

your right hand, and ſteadying yourſelf with the left hand on the gun or carriage.

10th. But when a retreat is ordered, you are to bring back your left heel to the hollow of your right foot, and face to the right about, and ſtep off with your left foot; but if retreating faſt, carry the ſpunge ſloped on your left ſhoulder, ſteadying your body with the right hand on the gun or carriage.

ART. V.

The gunner or bombardier who handles the cartridge (or charges the piece) has a very eſſential part in action, therefore it ought to be performed with carefulneſs.

Poſition 1ſt.

The gunner or bombardier is to be poſted on the left ſide of the gun, between the wheel and gun, with his body ſquare to the front, and ſo far back as to be clear of the muzzle of the piece when it is fired.

2d. Your right foot a moderate pace in front of your left, the toes turned a little outwards, your hands down on your ſide, with palms towards the thighs.

2d. Servant or man's duty. *He carries the lint ſtock, and a budge bag hanging on his left ſide with tubes or powder to prime with, and alſo a leather thong or ſhort drag rope hanging on his left ſide. In advancing he hooks it to the right waſher hook, and on retreating to the trail tranſom hook.*

During the action he ſtands on the right of the breech of the piece, in a line juſt clear of the wheel, in a recoil. He puts fire to the piece, when the ſignal to fire, by the ſecond ſervant, on the left of the piece, is given.

3d. Step with your left foot a moderate ſtep in front of the right foot, ſwivelling on the ball of the right foot; at the ſame time face to the right.

4th. Extend your right hand back to receive the cartridge from the matroſs, who carries the haverſack, receive the top of the cartridge towards you; and if caniſter, or fixed ſhot, the ball, or ſhot towards you; as ſoon as the gun is ſpunged, and the ſpunge is drawn out of the piece, enter the bottom end of the cartridge into the cylinder firſt;—Enter it in with your right hand, the back of it from you, and give it a little ſtroke with the palm of your left hand, in order that the rammer may more eaſily enter the cylinder of the piece.

5th. After you have charged the piece, return your left foot a moderate ſtep in rear of your right foot, ſwivelling on the ball of your right foot; which will bring you as poſition 2d.

ART. VI.

The matroſs who carries the haverſack, ought to be a pretty ſtout and ſtrong man, as the fatigue of

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3d. Servant or man's duty. *He is entruſted with the ammunition boxes or cheſt, which is carried on the fore carriage or limbers, and which he muſt fetch or carry to the limbers according to circumſtances.*

N. B. *The ſervants on a march ſhould hold their thongs or drag ropes in their hands, and not on the ſhoulder, as it would expoſe them to accidents, if the piece ſhould overſet, and when they have to go down a ſteep hill, they ought to hook them on the trail tranſom hook and hold back.*

carrying the ammunition to ſerve the piece in the field is conſiderable.

Poſition 1ſt.

You are poſted on the left ſide of the piece, and on the outſide of the wheel in front of the drag-rope (ſome officers poſt the matroſs who carries the haverſack behind the drag-rope, but I think in poſting him in front, he is more out of the way of the men at the drag-ropes, when changing them) with the haverſack flung on your left ſide, facing to the front. When firing keep your left hand in the haverſack ready to take out ſuch ammunition as may be wanted, putting it out of your left hand into the right hand, the top of the cartridge from you.

2d. Step with your left foot a moderate ſtep in front of the right foot, at the ſame time making a half face to the right, and changing the cartridge in your right hand, as above directed.

3d. With your right hand give the cartridge to the gunner, &c. Who charges the piece.

4th. Bring your left foot back, at the ſame time make a half face to the left, which brings you as poſition firſt.

The ſervice of a field piece, whoſe caliber is an eight pounder, managed by eight men of the royal artillery, and five men of the infantry.

Poſition of the men to the left of the piece.

2d. Cannonier's duty. *On the piece advancing he holds with both hands the left trail ſpike or lever, and the piece retreating, he holds only with his left hand.*

ART. VII.

The matroſs's who man's the drag ropes out, are to pay particular attention to the words of command, and the different beats of the drum.

Poſition 1ſt.

The men are poſted in the rear of the drag-ropes facing to the front.

2d. Thoſe on the right of the gun, look to the right, and dreſs ſquare to the front of the piece; thoſe on the left dreſs to the left, ſo that their eye will be to their reſpective pieces when firing.

3d. When you have orders for advancing, thoſe on the right wheel to the left, and thoſe on the left of the piece wheel to the right, (not ſo far that the wheel will rub the drag-rope) and when a halt is ordered, fall back with life and dreſs from right to left of the piece.

4th. In wheeling, if to the right, thoſe men on the right drag-rope fall back, as thoſe on the left drag-rope wheel to the right, ſo as to dreſs from right to left.

5th. The wheeling to the left is in the ſame manner as to the right, excepting, that the left falls back when the right wheels to the left, and dreſſes by each other.

6th. In changing the drag-ropes, from the wheel

During the action he ſtands in a line with the breech of the piece, on the left of the wheel, ſo as to be clear of it when the piece recoils. At the orders to charge, *he ſtops the vent, or touch hole, with his left hand, and gives the elevation to the piece with his right hand.*

to the trail, the matroſſes at the ends of the drag-ropes, ought to be very expert in hooking and unhooking at the wheel or trail, the men eaſe the ropes towards the wheel, ſo that they may unhook with eaſe.

7th. Thoſe men on the right drag-rope face to the left about, and thoſe on the left, are to face to the right about.

8th. And at the ſame time lift the drag-ropes over their heads—thoſe on the right of the gun with their right hands, and thoſe on the left, with their left hands.

Note.—There are ſeveral ways practiſed in changing the drag-ropes by different officers; but I think the above method is preferable, as the enemy would not kill more than one man at the drag-rope at a ſhot; but in either of the following ways of changing the drag ropes, a ſhot might kill three or four at a

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Servants or men ſerving the piece.

1ſt. Servant's duty. *He hath a long leather thong or rope, as before deſcribed, hanging on his right ſide: when advancing with the piece he hitches it on the breaſt tranſom hook, and when retreating on the left waſher hook at the wheel. During the action he ſtands in a line, a little to the left of the wheel. At the order* charge, *he goes to the left of the muzzle, by contrary motions to the ſervants on the right of the piece, and helps to ſpunge it out, and receives and puts the cartridge into the cylinder of the piece, and helps the firſt on the right to ram the charge with the rammer home; after which he takes his former poſition.*

time. It is the duty of an officer to ſtudy thoſe parts of the exerciſe which are moſt eſſential to the ſervice he is in, and in action expoſe the men the leaſt. To change in order to retreat the men at the wheels, unhook and retire by ſingle files; the men who were on the flanks in advancing bring up the rear, and hook at the trail; the men who were next the wheel in advancing, come on the flanks in retreating.

In retreating, when ordered to change drag-ropes, in order to advance, the men who hook at the trail, unhook, and face about and advance and come on the flanks of the drag ropes as poſition 1ſt.

And ſome officers change drag-ropes: Thus thoſe men on the flanks of the drag-ropes fall back to the trail of the carriage and hook, while thoſe at the wheels wheel out and come on the flank and retreat ſimilar to poſition 3d.

To change the drag-ropes in order to advance, thoſe on the flanks fall back, and hook the end of the drag-ropes at the wheel, while thoſe who were at the

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2d. Servant's duty. *He carries a pouch or tube box before him, with a waiſt belt, in which is fixed the priming wire: When the piece is to advance, he places himſelf with his face to the enemy (or front) at the croſs lever, which is placed at right angles with the piece, juſt behind the center tranſom of the carriage, made ſo as to ſlip out occaſionally, and help to lift the trail, and to puſh the piece forwards, and on retreating, with the piece in an oppoſite direction. During the action he ſtands in a line with the breech of the piece, juſt clear of the recoil of the wheel, to the left of the 2d. cannonier; and he goes* trail wheel outwards and come on the flanks, as poſition 3d.

ART. VIII.

The Matroſſes who carry the ſide boxes of the piece, while firing, ought to be pretty ſtout men, as the fatigue is conſiderable; three men are taken from each piece, the boxes are taken off the carriage and retire in the rear of their reſpective pieces.

Poſition 1ſt.

They take poſt three paces in rear of the gunner at the tiller, and face to the front, and ſet down their boxes, with the front of them to the rear, ſo as not to be expoſed when opening the lids. The man in the center takes a handle of each box and carries in advancing in the rear, and on retreating at the ſame

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to the piece after him, and cleanſes the vent with the right hand, and with the left he puts the tube in the vent, or primes, after which he retires to his poſt, and beckons with his right hand, to the 2d. ſervant on the right of the piece, to fire.

3d. Servant's duty. *He hath a ſhortened thong or belt, hanging on his right ſide: on the piece advancing he hooks it on the breaſt tranſom hook; placing himſelf to the left of the firſt ſervant. But when the piece is to retreat, he hitches to the waſher hook on his left. He is purveyor of the piece, and carries a haverſack on his left ſide. During the action, he gives the cartridge to the firſt ſervant on the left of the piece, and goes to the ammunition cheſt, and repleniſhes his haverſack when its empty.*

diſtance; only facing to the right about, and retiring before the men at the piece.

2d. On a halt ſet down the boxes, and face to the front. Theſe men are to make themſelves acquainted with the ammunition in the boxes, ſo as to ſupply the pieces with ſuch as is wanted, and to repleniſh them from the ammunition waggon, or tumbrel. The officer commanding ſhould be cautious to put only truſty men on this duty as the charge of the boxes is of importance in action; they ſhould relieve each other alternately in carrying in center of the boxes; and, when the firing ceaſes, to fix the ſide boxes on the carriage as before, and to retire to their poſt at the drag-ropes.

ART. IX.

Of the words of command for the manual exerciſe of field-pieces.

Attention!	(*See Chap.* 4.)
Unlimber pieces!	(*See Chap.* 7. *Art.* 5.)

4th. Servant's duty. *He hath a leather thong or ſhoulder belt,* &c. *hanging on his right ſide, when the piece is to advance, he hitches it on the left waſher hook; and when a retreat is ordered, to hook it to the trail tranſom hook. He is alſo a purveyor of the piece, and carries a haverſack hanging on his left ſide; he helps the fourth ſervant to lift up the ammunition box or cheſt, and take it on and off of the fore carriage, or limbers. During the action, he is to place himſelf between the piece and the ammunition cheſt, and takes the place of the 3d. ſervant, while he goes to repleniſh his haverſack with ammunition, and ſo on alternately.*

If the field-pieces is previouſly limbered, if not, the word is not applied.

Secure ſide boxes! (*See Chap.* 6, *Art.* 8.)

Man out—the pieces! (*See Chap.* 6, *Arts.* 1—8.)

From right to left—dreſs! (*See Chap.* 6, *Art.* 7, &c.)

Advance ſpunge! (*See Chap.* 6, *Art.* 4, *Poſ.* 3d.)

Tend—vent! (*See Chap.* 6, *Art.* 3d *Poſ.* 3d.)

Spunge piece! (*See Chap.* 6. *Art.* 4. *Poſ*, 6. *and* 7.)

Handle cartridge! (*See Chap.* 6. *Art.* 6. *Poſ. and Art.* 5. *Poſ.* 4.

Charge—Piece! (*See Chap.* 6. *Art.* 5. *Poſ.* 4.)

Note, If there is more than one piece add the plural to it.

Ram down—Cartridge! (*See Chap.* 6. *Art.* 4. *Poſition* 7. *and* 8.)

Prime! (*See Chap.* 6. *Art.* 3. *Poſ.* 3. 4. 5. 6. 7. 8. 9. 10.)

Take Aim! (*See Chap.* 6. *Art.* 1. *Poſ.* 1. *and* 2.)

Fire! (*See Chap.* 6. *Art.* 2. *Poſ.* 3. *and* 4.)

Change—Drag-ropes! (*See Chap.* 6. *Art.* 7. *Poſ.*

5th. Servant's duty. *He hath a leather thong or ſhoulder belt ſhortened, hanging on his right ſide, and hath the guard of the ammunition cheſt; but if the ground where the piece is, ſhould prove bad and difficult, he muſt advance to the piece, and hook his thong or drag rope,* &c. *to the left ſide of the fourth ſervant, when the piece advances; but when it is to retreat, to the right of him: He is alſo a purveyer of the piece. During the action, he takes the place of the fourth ſervant occaſionally, and proceeds in like manner.*

6th. Servant's duty. *This man belongs to the body of the artillery, and is to guard the fore carriage or*

6. 7. *and* 8.—This may be done by a ſignal of the drum, viz. a tap or flam. *Chap.* 8.

Unhook—Drag-ropes ! (*See Chap.* 7. *Art.* 5.)
Mount—Side-boxes ! (*See Chap.* 6. *Art.* 8. *Poſ.* 2.)
Limber Pieces ! (*See Chap.* 7. *Art.* 5.)
Shoulder rammer ! (*See Chap.* 6. *Art.* 3. *Poſ.* 10.)
Carry—Lint-ſtock ! (*See Chap.* 6. *Art.* 2. *Poſ.* 6.)

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limbers, and the ammunition cheſt, and to be always ready to give his aſſiſtance to the piece when wanted, by placing himſelf between the two trail ſpikes or levers, and helping the two cannoniers to ſupport the carriage, and puſhing it forwards or backwards. He is to fetch the fore carriage, or limbers, to the piece, or remove them as circumſtances may require.

Poſition of the men at the right ſide of the piece.

1ſt. Cannonier's duty. *When orders are given for the piece to advance, he holds the right trail ſpike, or lever, with both hands; and when a retreat is ordered with the piece, he holds it with his right hand.*

During the action he ſtands between the two trail ſpikes or levers, he is to pay attention, that the 2d. cannonier and all the ſervants are at their poſts; at the orders to charge, *he levels the piece to the object, while the men load it; after which he retires to the right or left ſide of the piece, according to the courſe the winds blow, in order to obſerve the effect of the ſhot.*

Servants or men ſerving the piece.

1ſt. Servant's duty. *He hath a long leather thong or belt, hanging on his right ſide; he carries the ſpunge,*

CHAP. VII.

THE EXERCISE OF A COMPANY WITH FIELD-PIECES.

The company is to be paraded in two ranks, at one pace diſtant, with the ſhorteſt men ſized* in the center of each rank, (this mode is different from that practiſed in the infantry, where the talleſt men are

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* It is abſolutely neceſſary, that the men be properly ſized, as it adds greatly to the appearance of a company; there are various ways to perform it; but agreeable to the late Baron Steuben's ſyſtem each company is to have their ſize taken and inſerted in a roll, by which they parade, and every man to be acquainted with his right and left hand man, which enables them to fall in place on parade inſtantly.

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and when the piece advances, the ſpunge is carried on his left ſhoulder, and he hooks his thong or belt, &c. *to the breaſt tranſom hook, and on retreating, to the right waſher hook, at the end of the axletree. During the action he ſtands a little forward on the right of the wheel, and holds his ſpunge horizontally. At the orders* charge, *he goes to the muzzle of the piece, making a long ſtep with his left foot, placing his right foot in a line parallel to the piece, and his heels eighteen inches apart; he ſpunges the piece and then rams the cartridge* ſized in the rear rank; but it is neceſſary when the men are poſted at the drag-ropes, that the talleſt men ſhould be on the flanks and the ſhorteſt men next the wheels,) The company thus drawn up, the oldeſt ſerjeant is to divide them into two ſections, or platoons,—The officers then take their poſts.

The Captain takes poſt, on the right of the company.—The Captain Lieut. on the left of the company, or ſecond ſection, covered by a ſerjeant.—The firſt lieutenant on the right of the firſt ſection, covered by a ſerjeant.—The ſenior 2d. lieutenant, on the right of the center, (or left of the firſt ſection,) covered by a ſerjeant. – The Junior 2d. lieutenant, on the left of the center, covered by a ſerjeant or corporal*.—The firſt ſerjeant is to take poſt two paces behind the center of the company, and the reſt of the corporals,

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* In a ſimilar order be the number of officers more or leſs as the eſtabliſhment may vary.

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home with his rammer, and then retires on his right foot to his former poſition.

2d. Servant's duty. *He carries the lint-ſtock and a budge bag, hanging on his left ſide, with tubes or powder to prime with, and holds the lint ſtock with his right hand. When the piece advances, he takes poſt at the croſs lever, and faces to the front, or enemy, helps to lift the trail, and puſh the piece forward, and on retreating in an oppoſite poſition.*

During the action he ſtands in a line with the breech of the piece, juſt clear of the right wheel when it recoils, bombardiers, and gunners, are to be divided equally on the flanks of the ſections, or platoons,—The muſic on the right as Plate 1. fig. 1.

Of opening the ranks.

(*Plate* 1, *Fig.* 2.)

ARTICLE I.

Rear rank! take—diſtance! march!

As before explained, chap. 5, art. 1, excepting the officers divide themſelves equally in front, and dreſs in a line; the ſerjeants who cover the officers, at the ſame time face to the right and left about from the center, and march two paces behind the center of their reſpective platoons, and face to the right about and dreſs in a line.

Rear rank! cloſe to the front!—March!

As before explained chap. 5. art. 1. And the officers and ſerjeants return to their former poſts.

ART. II.

Of marching and wheeling.

Marching and wheeling well is of the greateſt importance in performing the evolutions in real ſervice;

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he unhooks the budge barrel from the carriage. When orders are given to fire, and when the piece moves, he hooks it on. He puts fire to the piece when the ſignal is given by the ſecond ſervant on the left of it.

3d. Servant's duty. *He hath a ſhortened thong or belt, hanging on his left ſide: when the piece is ordered to advance, with it he hooks himſelf to the breaſt tranſom hook, to the right of the firſt ſervant, and on retreating he hooks to the right waſher hook, ſtanding alſo to his right.*

the officers can't be too attentive in rendering the men as perfect in it as poſſible, for further explanation ſee chap. 5. art. 4.

Sections! to the—Right! Wheel! march!

(*Plate* 1. *Fig.* 3.)

The officers take poſt in the front of the ſections, and the Capt. Lieut. brings up the rear of the company: the ſerjeants fall in the rear of their reſpective ſections.

The company marches to the park where the artillery they are to exerciſe are depoſited.—If they are to exerciſe with limbers, and horſe,—then orders

Sections! open ranks! march!

(*Plate* 2, *Fig.* 1.)

In this poſition each rank is conſidered as a platoon, and the officers and ſerjeants divide themſelves accordingly; the ranks or platoons are to be opened equal to the length of them.

Note.—When in front of the park, if to exerciſe without limbers command

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During the action he retires to the fore carriage or limbers, where he helps the purveyors to fill their haverſacks, and ſhould ſupply the place of ſome of the men at the gun, if wanted.

4th. Servant's duty. *He hath a long thong, &c. hanging on his left ſide, and helps the* fourth *ſervant on the left of the piece, to lift up the cheſt, and lay it on the fore carriage or limbers. When the piece advances he hooks himſelf with his thong to the waſher hook, and when retreating to the trail tranſom hook. During the action, he retires to the ammunition cheſt.*

Platoons! to the right face! march!

(Plate 2. Fig. 2.)

They march on the flanks of their reſpective pieces.

Platoons! to the right! and left—Face to your reſpective pieces.—And man them out!

The bombardiers, and gunners take charge of the apparatus, and the matroſſes, the drag-ropes, &c. and hook one end to the waſher hooks at the wheel, and ſtretch them on the ground, and the matroſſes parade in the rear of the drag-ropes, the talleſt men on the flank of their piece, and the ſhorteſt men next the wheels, as they where ſized on parade, the bombardiers take their poſt at the pieces, to ſerve them.

5th. Servant's duty. *He hath a ſhort thong hanging on his left ſide, and is to aſſiſt in guarding the cheſt, and if the ſituation of the ground ſhould be bad, where the piece ſtands, and it requires to be moved, he muſt hook himſelf with his thong on the right of the fourth ſervant, and on his left when retreating. During the action he retires to the ammunition cheſt.*

To put the trunnions forward.

The ammunition cheſt muſt be taken out from between the cheeks of the carriage, which ought to remain on the fore carriage or limbers. The two cannoniers and the two firſt ſervants, ſhall take each a lever, in the mean time, the two ſeconds muſt take out the fillets, which they are to lay on the ground, before the wheels, to ſup-

ART. III.

Attention!

Caution.

Take care to go through the exerciſe! and firings!

Take up—Drag-ropes!

The men take up their drag-ropes, and dreſs from the right to left,—The gunner at the ſpunge dreſſes as, art. 4. poſ. 3. of the manual exerciſe.

Forward—March!

The pieces advance in a line, in a ſlow pace, the drums beat, the grenadiers march to ſuch a diſtance as the commanding officer thinks proper—then commands

Halt!

They halt and dreſs from right to left of the line; —The commanding officer gives the ſignal for the drummer to beat the preparative;—Then the right piece begins the fire to the left alternately;—The men who charge and fire the piece, muſt be very attentive in their duty, as directed in the manual exerciſe, in order to prevent accidents, and that the fire may do the execution intended. The gunner at

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port them. The firſt ſervant of the left ſide of the piece, muſt put his lever in the muzzle of it. The firſt ſervant of the right, and the ſecond cannonier of the left, put their levers under the caſcabel. The firſt cannonier afterwards puts his lever, as a roller, under the firſt; after which the firſt ſervant of the right, puſhes his lever the tiller, muſt be particular in guiding the piece agreeable to the directions of the commanding officer; to oblique to the right, or left; in order to avoid any obſtacles in front, or to preſerve the proper diſtance between the guns;—Which ſignal is given by waving his ſword to the right or left, as occaſion requires.

The gunner who guides the piece by the tiller is to take ſome object in front as a point of view, as already directed; after the manual exerciſe and the firings are finiſhed, the drummer is directed to beat the firſt part of the General, which is an invariable ſignal for all firing to ceaſe.

ART. IV.

Caution!

Take care to perform the evolutions!

Note.—This is performed on the principle of plates.

Pieces advance by the right! the right in front! march!

The piece on the left marches obliquely to the right with a quick pace, till they gain the rear of the

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croſsways, under that which is in the muzzle, and the ſecond cannonier of the left, puſhes the thick end of his lever in one of the handles of the piece, to keep it ſteady. The ſecond and third ſervants go to the lever which is croſsways, and help to lift up the piece, while the firſt cannonier turns his lever as a roller, in order to let the piece ſlide gently down in its firſt place, (or trunnion holes, for the convenience of marching; the weight being more equally divided on the limber and carriage front piece, then marches directly forward, preſerving the proper diſtance between the pieces.

If occaſion requires, the front piece may commence a fire, (if the enemy ſhould ſhew a diſpoſition to diſpute the paſſage of the defile, *&c,*) as they advance, or, the pieces may wheel to the right, excepting the right piece, and march to the rear of the front, or right hand piece; and wheel to the left;—either of theſe ways may be performed occaſionally.

Take care to diſplay pieces to the left! march!

The pieces march in an oblique direction till they gain their place in the line, and dreſs by the right piece: or they may wheel to the left and march directly forward, till they unmaſk themſelves; then wheel to the right and march to their ſtation in the line, as circumſtances require; and if neceſſary, to

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wheels.) All the men muſt work with their ſtrength, caution, and without jolting. The ammunition cheſt is put on the fore carriage, or limbers, between the two bolſters and fore guide, to which it muſt be faſtened. But when the piece is limbered, the ammunition cheſt is faſtened on the fore guide, juſt forward of the fore axletree. When it is neceſſary to fire, the piece is to ſlide back again into the ſecond place, or trunnion plates.

N. B. *The ſervants muſt hold their thongs, in caſe the piece ſhould be in danger of overſetting, in the ſame manner as for four pounders, as well as in the evolutions to be made with the fore carriages or limbers, and horſes.*

commence their firing as they form and dreſs in the line.

Pieces advance by the left! the left in front! march!

This is performed in the ſame manner as the preceding, only marching obliquely to the left inſtead of the right; the officers will conduct their reſpective pieces.

Take care to diſplay pieces to the right! march!

This is done to the right on the ſame principles as the other, formed to the right, is diſplayed to the left.

The ſervice of a field-piece whoſe caliber is a twelve pounder, managed by eight men of the royal artillery, and ſeven men of the infantry.

Poſition of the men to the left of the piece.

2d. Cannonier's duty, *is the ſame as in managing the eight pounder in the field. See the duty of the eight pounder.*

Servants, or men ſerving the piece.

1ſt. Servant's duty. *For the particulars, ſee his duty in managing the* 8 *pounder, it being the ſame.*

2d. Servant's duty *is ſimilar to the ſervice of the* 8 *pounder, for particulars ſee that duty.*

3d. Servant's duty *is the ſame. See the ſervice of the* 8 *pounder.*

Company to the right! wheel! march!

The right piece forms a pivot to wheel on, and the left pieces come up with life, and enlarge their ſteps in proportion to the diſtance they are from the right, or pivot, and keep dreſſed by the right, till the wheel is performed, as art. 7, poſ. 4, of the manual exerciſe with field-pieces.

(*On the principle of plate* 2, *fig.* 3, 4.)

Halt! dreſs!

Company to the left! wheel! march!

This is done ſimilar to the right, only the left piece forms the pivot to wheel on, and the right lengthens their ſtep in proportion to the part of the circle which they wheel on, when performed.

Halt! dreſs!

4th. Servant's duty *is the ſame as in the ſervice of the* 8 *pounder.*

5th. Servant's duty. *When the piece is te be unlimbered, he helps the fifth ſervant of the right to liſt up the ammunition cheſt, and places it on the fore carriage (or limbers). When the piece advances, he goes to the croſs-lever of the carriage, on the right of the ſecond ſervant, whom he helps to liſt up the trail, and to puſh the piece in advancing. But, on retreating, he goes to the muzzle of the piece, laying his left hand on it, and his right to the handles of the piece, to help to puſh. He is a purveyor of the piece, and hath a haverſack. During the action he ſtands between the ammunition cheſt and piece, and takes occaſionally the place of the fourth ſervant, and proceeds in the ſame manner.*

Single pieces to the right wheel! and form the open column! march!

Each piece wheels on the ground it ſtands on, the men at the drag ropes conduct themſelves as in Art. 7. Poſ. 4. of the manual exercise.

Halt! Dreſs!

Single pieces to the left! wheel! march!

This is done ſimilar to the company wheeling to the left.

Halt! Dreſs!

ART. 5.

To exerciſe the field pieces with limbers and horſes.

The company being formed on the parade, they march to the park, where their pieces are depoſited by *platoons*, as Art. 2. When they arrive in front of the pieces they are to exerciſe; then direct the pieces, &c. to be drove to the company, as repreſented in Plate 2. Fig. 1, 2.

Company, forward! march!

The company marches to the ground they are to exerciſe on, with the firſt piece between the firſt and

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6th. Servant's duty. *He hath a belt or thong, &c. hanging on his right ſide, and generally hath the care of the ammunition cheſt.—But, if the place where the piece ought to fire be bad, and it be neceſſary to advance, he is to go to the left waſher hook, and hitch his thong on, to the left of the fourth ſervant; and retreating, he hooks to the trail tranſom hook; During the action, he muſt take again his poſition at the cheſt.*

ſecond platoon, and the ſecond piece between the third and fourth; the ammunition waggons or tumbrels in the center of the company. But when they march at the head of a column, the ammunition tumbrels march in the rear of the company; when they march in the center of a column of infantry, the tumbrels, &c. are to march in the center of the company; and when they cover the rear of a column, the tumbrels march in the rear of the column between that and the field-pieces.

When the company arrives at the ground they are to exerciſe on, commands

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13th Servant's duty. *This man belongs to the body of the artillery, and is to guard the fore-carriage, or limbers and the ammunition cheſt. But he is to aſſiſt the men at the piece, and place himſelf between the two trail ſpikes, or levers, to help the cannoniers to ſupport the trail of the carriage: on advancing, to puſh it forwards, as alſo, when retreating, he fetches the limbers to the piece, or takes them away, as circumſtances may require.*

Poſition of the men to the right of the piece.

1ſt. Cannonier's duty *is the ſame as in the ſervice of the* 8 *pounder. See directions.*

Servants, or men ſerving the piece.

1ſt. Servant's duty. *For particulars ſee the ſervice of the* 8 *pounder.*

2d. Servant's duty. *See his duty in the ſervice of the* 8 *pounder.*

3*d*. Servant's duty. *See his duty in the ſervice of the* 8 *pounder.*

Platoons! from the center, to the right! and left turn!—Counter march!

(*Plate* 3.)

The men in each platoon face; thoſe of the right wing of the platoon face to the right, excepting the right hand man, he marches directly forwards; the others in ſucceſſion, as they arrive on his ground, turn to the left, and march forward on the right flank of

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4th. Servant's duty. *See his duty in the ſervice of the* 8 *pounder.*

5th. Servant's duty. *When the piece is to be unlimbered, he helps the fifth ſervant of the left of the gun, to take the cheſt from the carriage, and lays it on the limbers or fore carriage. When the piece is to advance, he goes to the croſs-lever at the left of the ſecond ſervant of the right ſide of the piece, and helps to lift up and puſh forwards; and on retreating he goes to the muzzle, laying his right hand on it, and the left to the handles of the piece. During the action he retires to the ammunition cheſt and attends there.*

6th. Servant's duty. *He hath alſo a ſhort thong, &c. and is appointed to guard the ammunition cheſt; and if in caſe the ſituation of the ground is not favorable to fire on, he helps the other ſervants to move the piece; and on advancing with it, he hitches his thong on the right waſher hook, to the right of the fourth ſervant; and on retreating he hooks to the trail tranſom hooks; being to the left of the fourth ſervant. During the action he muſt retire to his poſt at the ammunition cheſt.*

the piece; and thoſe on the left flank of the platoon, face to the left, excepting the left hand man, who marches directly forward on the left flank of the piece, the others, as they arrive on his ground, turn to the right and march forward. The officers lead the platoons; the captain marches at the head of his company; the captain lieut. brings up the rear of the company; the firſt lieut. marches at the head of the platoon, on the right flank of the piece, and junior 2d. lieut. on the left of the piece, and the other ſubalterns in rotation of rank.

N. B. *The ſervants muſt hold the thongs in their hands, and hitched on the piece, when paſſing through rough ground, to prevent it from overſetting, as before obſerved. And to ſhift the trunnions forward or backward; ſee what has been ſaid under the article of the* 8 *pounder ſervice.*

The exerciſe and evolutions of field pieces, limbers and horſes.

When the artillery are to make long marches, either in advancing or retreating; or when it muſt cover a column in danger of an attack from the enemy on its flanks: or is to croſs bad ditches, or paſs over very hilly places, &c. with pieces of artillery of three different ſizes, the artillerymen will lay the trail of the carriage on the ground, and a rope muſt be tied at one end to the fore carriage or limbers, it paſſes over the axletree, and round the pintle, or pole-belt, afterwards over the lid of the box, and is tied by the other end to the trail ring of the carriage. They leave about 24 *feet of the rope between the piece and limbers, to which the horſes may*

Platoons! to the right! and left turn! to the center—unlimber pieces!

The platoons on the right flank of the piece turn to the left, and thoſe on the left of the piece turn to the right, and march to the piece, which they unlimber,* and man it out, either for exerciſe or ac-

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* You muſt obſerve, that the muzzle of a piece, when unlimbered, is always conſidered to be the front, therefore the right flank of the pieces: the firſt and third platoons hook their drag ropes on the ſecond and fourth; conſequently on the left flank of their reſpective pieces, otherwiſe the platoons would be in a reverſed poſition.

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remain geared. The piece is drawn by the rope, which follows eaſily, as the end of the trail is rounding like a ſleigh runner. The cannoniers muſt carry each his implements, going with their piece, and keeping their reſpective places at the right and left of the piece; and when it is neceſſary to fire, the maſter cannonier commands, Halt! *levels his piece, and orders to load: after the piece is fired, if he does not think proper to fire any more, he orders the piece to* march, *and the driver drives on. If the piece has to go up or down bad hills, or to leap over ditches, or a ravine, &c. as ſoon as the horſes have arrived at ſuch a place, the cannoniers lengthen the ropes if it is neceſſary, and go to the piece: while the horſes paſs with the limbers, take out the levers of the trail, or trail ſpikes, and hook their thongs, &c. If going down a hill, or ditch, or ravine, to the breaſt tranſom and waſher hooks; but if going up hill,* &c. *they hook to the* tion. After the exerciſe or action is over, and orders are given to march, for which it may be neceſſary to limber the pieces, the commanding officer of artillery orders

Caution.

Take care to limber the pieces.

At this caution the ſerjeants will attend that the drivers fetch the limbers.

Unhook drag ropes!—Limber pieces.

The men at the drag ropes unhook, and fix them to the breaſt tranſom hooks of the carriage, and do

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trail and center tranſom hooks, and to the waſher hooks. If the piece is heavy, the men are not to faſten their thongs to the ſhoulder belts, but to carry them in their hands, to ſupport the piece, for fear of accidents in overſetting, as the horſes go down, or leap over the bad places; the men muſt make uſe of the levers, to diſengage the trail if it catches any thing.

The artillery can perform very long marches firing at the enemy, to keep at a proper diſtance, on a retreat, without fatiguing too much the artillerymen, who may march as faſt as the lighteſt infantry.

The leather thongs before mentioned, muſt be made with Ruſſian leather, they ought to be two feet and a half long including the iron ring, and three inches wide; the treſſes, or drag ropes, muſt be made of good hemp, half of an inch thick, and ſeven feet and a half long, including the ſtitch where it is fixed in the ring, and the eye at the other end of the rope where its laced or ſpliced to itſelf, to be about ſixteen inches. The treſs, or drag them up; the ſide boxes are brought and put on the carriage. The pieces are to be limbered in the direction in which they are to march. Then orders

Form platoons! in front and rear of the pieces!

(*As Plate 2d Fig. 1.*)

The non-commiſſioned officers and matroſſes muſt be very attentive in knowing their places, and their right and left hand man, as activity is neceſſary in performing this part of duty. The commiſſioned of-

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ropes, ſhould have, at three feet from the ſtitch, an iron hook, which is uſed to ſhorten it, by putting it in the ring of the thong or belt. Its whole length ſhould be ſix feet, and when it is not made uſe of, it ſhould be nine feet, by which means accidents may be repaired.

The haverſacks, and thoſe pouches or budge bags and budge barrel covers, as alſo the ſpunge caſes, ſhould be made with glazed leather; becauſe experience hath taught us, that thoſe of hairy leather are very apt to catch fire.

It is natural for perſons to be prejudiced in favor of the way in which they have been educated; but it appears to me that the manual exerciſe of field artillery, as uſed by the French, will not admit of that celerity in performing the exerciſe, as that practiſed by the Engliſh and Americans; but I ſhall leave it to the judicious reader to judge for himſelf. It was with the greateſt difficulty that I could procure a tranſlation of the exerciſe, on account of tranſlators, in general being unacquainted with the technical terms uſed in the artillery, ficers will then take poſt in front of their reſpective platoons, as before directed.

But if it ſhould be neceſſary that the platoons be formed on the flanks of the pieces, on account of marching more convenient, or of unlimbering on the ſudden emergency of an attack from the enemy, the commanding officer of artillery, may order when the piece is limbered

Form platoons!—on the flanks of the pieces.

(*As plate* 3.)

The non commiſſioned officers and matroſſes form on the flanks, in a ſingle file, as above directed, facing the front, if advancing, the commiſſioned officers leading the platoons, as before explained. But in retreating orders, to the right about face!

Forward! march!

And marches to the park to depoſit the pieces. *&c.*

But it may be neceſſary, in ſome ſituations, to change from this poſition, and form platoons in front and rear of the pieces, for which purpoſe, the officer commanding orders

Form platoons in front & rear of the pieces!

March!

The file leader on the right of the piece in front, or the right hand man of the firſt platoon, inclines to the right, ſhortening his ſtep, till he is unmaſked or uncovered; they then march forward and form in a line, and ſo on in ſucceſſion. The file leader or left hand man of the firſt platoon, inclines to the left, in in the ſame manner as they did to the right. When the line is formed, the firſt platoon lengthens their ſtep, till they gain the front of the 1ſt. piece, then cloſe the platoon to the center and dreſs. The officers take poſt in front of the platoon, as before directed.

The ſecond platoon forms in the ſame manner as the firſt, only ſhortening their ſtep, ſo as to fall in the rear of the firſt piece, and cloſe to the center and dreſs.

The third and fourth platoons form in the ſame manner as the firſt and ſecond platoons: when this is performed, the pieces move very ſlow.

But to perform this on a retreat, the ſections of the platoons on the flanks of the pieces turn to the right and left, and then wheel to the right and left, and form the platoon; the fourth or near platoon lengthens their ſtep, as the firſt did in advancing, and inclining to the center and dreſs. The other platoons perform in the ſame manner, excepting that thoſe who march in the rear of the piece they belong to, ſhorten their ſtep and form their platoons.

Note. In croſſing bad places and gulleys, chains or ropes might be fixed to the trail tranſom hooks, from thence to be brought under the axeltree of the limbers, and over the fore part of the axeltree, on the pintle: in this ſituation, men would be relieved from conſiderable fatigue in retreat; and as the trail ſlides on the ground, the fire may be kept up without any inconveniency either to limbers or horſes; and in paſſing a bad gully, the rope might be let out ſo that the limber and horſes will be over it before the piece enters, and be of great ſervice in drawing.

CHAP. VIII.

OF THE DIFFERENT BEATS AND SIGNALS GIVEN BY THE DRUM.

It is neceſſary that the young artilleriſt ſhould be made acquainted with the ſounds and beating of the drum; as whether it be the general, aſſembly, march, revielle, troop, retreat, tat-too, to arms, parley, chamade, &c.

As they are thereby taught to march and perform the exerciſe and manœuvres, &c. it is proper to teach them every other ſound and ſignal, which, agreeable to Baron Steuben's regulations for the army of the United States, are as follows:

The different daily beats ſhall begin on the right, and be inſtantly followed by the whole army; to facilitate which, the drummer's call ſhall be beat by the drums of the police, a quarter of an hour before the time of beating when the drummers will aſſemble, before the colours of their reſpective battalions; and as ſoon as the beat begins on the right, it is to be immediately taken up by the whole army, the drummers beating along the front of their reſpective battalions from the center to the right, from thence to the left, and back again to the center, where they finiſh.

Beats.

The General, is to be beat only when the whole are to march, and is the ſignal to ſtrike the tents, and prepare for the march.

The Aſſembly, is the ſignal to repair to the colours.

The March, for the whole to move.

The Revielle, is beat at day break; and is the ſignal for the ſoldiers to riſe, and the centries to leave off challenging.

The Troop, aſſembles the ſoldiers together for the purpoſe of calling the roll, and inſpecting the men for duty.

The retreat is beat at ſun ſet, for calling the roll, warning the men for duty, and reading the orders of the day.

The Tat-too is for the ſoldiers to repair to their tents, where they muſt remain till reveille beating next morning.

To Arms is the ſignal for getting under arms in caſe of alarm.

The Parley is to deſire a conference with the enemy.

The ſignals.

Adjutant's Call—Firſt part of the troop.

Firſt Serjeant's Call—One roll and three flams.

All non-commiſſioned Officers Call—two rolls and five flams.

To go for wood—Poing ſtrokes and ten-ſtroke roll.
water—two ſtrokes and a flam.
proviſions—Roaſt Beef.

Front to halt—two flams from right to left, and a full drag with the right, a left hand flam and a right hand full drag.

For the front to advance quicker—the long march.
to march ſlower—the taps.

For the Drummers—the Drummer's Call.

For a Fatigue Party—the Pioneer's March.

For the Church Call—the Parley.

The drummers will practiſe a hundred paces in front of the battalion, at the hours fixed by the adjutant general; and any drummer found beating at any other time (excepting ordered), ſhall be puniſhed.

There are ſeveral other ſignals which may be neceſſary for him to be acquainted with, as practiſed in the Britiſh army, &c.

To turn or face to the right—one ſingle ſtroke and flam.

To turn or face to the left—two ſingle ſtrokes and flam.

To the right about—three ſingle ſtrokes and flam.

To the left about—four ſingle ſtrokes and flam.

To wheel to the right—one ſingle roll ſtroke and flam.

To wheel to the left—two rolls, ſingle ſtroke, and flam.

To wheel to the right about—three rolls, ſingle ſtroke, and flam.

To wheel to the left about—four rolls, ſingle ſtroke, and flam.

To the front—a ſtrong double flam.

To form battalion—beat to arms.

In exerciſing with field pieces—a preparative is to commence firing from right to left.

The General—is an invariable ſignal for all firing to ceaſe.

To change the poſition of the drag-ropes—one flam.

CHAP. IX.

OF THE FORMATION OF A REGIMENT, AND THE EXERCISE WITH FIRE-LOCKS.

(*Plates* 4—5. *fig.* 3.)

ART. I.

As the artillery is required, in certain caſes, to do duty with fire-locks, therefore it willnot be amiſs in this place to inſert the formation and exerciſe of a regiment, as eſtabliſhed by the laws of the United States.

A regiment is to conſiſt of eight companies, which are to be poſted in the following order, from right to left:

First Captain's,
Sixth Captain's,
Fourth Captain's,
Eighth Captain's,
Third Captain's,
Seventh Captain's,
Fifth Captain's,
Second Captain's.

For the greater facility in manœuvring, each regiment conſiſting of more than one hundred and ſixty files, is to be formed in two battalions (plate 5.), with an interval of twenty paces between them, and one colour poſted in the center of each battalion; the colonel fifteen paces before the center of the firſt battalion, the lieutenant colonel fifteen paces before the center of the ſecond battalion, the major fifteen paces behind the interval of the two battalions, the adjutant two paces from the major, the drum and fife major two paces behind the center of the firſt battalion, their places behind the ſecond battalion being ſupplied by a drum and fife, and the other drums and fifes equally divided on the wings of each battalion.

When a regiment is reduced to one hundred and ſixty files, it is to be formed in one battalion, plate 4, fig. 3, with both colours in the center; the Colonel ſixteen paces before the colours; the Lieut. Col. eight paces behind the Colonel; the Major fifteen paces behind the center of the battalion, having the Adjutant at his ſide; the drum and fife major two paces behind the center of the battalion; and the drums and fifes equally divided on the wings.

Every battalion, whether it compoſe the whole, or only half of a regiment, is to be divided into four diviſions and eight platoons—no platoon to conſiſt of leſs than ten files; ſo that a regiment conſiſting of leſs than eighty files, cannot form a battalion, but muſt be incorporated with ſome other, or employed on detachment.

In caſe of the abſence of any field officer, his place is to be filled by the officer next in rank in the regiment, and in order that the officers may remain with their reſpective companies, if any company officer is abſent, his place ſhall be ſupplied by the officer next in rank in the ſame company; but ſhould it happen that a company is left without an officer, the colonel, or commanding officer, may order an officer of another company to take the command, as well for the exerciſe, as for the diſcipline, and police of the company in camp.

When the light company is with the regiment it muſt be formed twenty paces on the right, on the parade; but muſt not interfere with the exerciſe of the battalion, but exerciſe by itſelf. And when the light infantry are embodied, every four companies will form a battalion, and exerciſe in the ſame manner as the battalion in the line.

ART. II.

The exerciſe of the battalion.

When a battalion parades for exerciſe, it is to be formed, and the officers poſted, agreeably to the inſtructions already given in the firſt article of this chapter.

The battalion being formed, it is then to perform the manual exerciſe, and the wheelings, marches, manœuvres and firings deſcribed in this and the following chapters, or ſuch of them as ſhall be ordered.

N. B. When a battalion performs the firings, the ſix centre files (viz. three on each ſide the colours) are not to fire, but remain as a reſerve for the colours; the officers of the two center platoons are to warn them accordingly.

The battalion will wheel by diviſions or platoons, agreeable to the word of command, from the commanding officer.

By $\left\{\begin{matrix}\text{Platoons}\\ \text{Diviſions}\end{matrix}\right\}$ To the $\left\{\begin{matrix}\text{Right}\\ \text{Left}\end{matrix}\right\}$ Wheel.

March!

When the battalion wheels, the platoons are conducted by the officers commanding them. The ſupernumeraries remain in the rear of their reſpective platoons, (See plate 4. fig. 2.) and the colours take poſt between the fourth and fifth platoons.

The wheeling finiſhed, each officer commanding a platoon or diviſion, commands

Halt! Dreſs to the right!

And poſts himſelf before the center, the ſerjeant who covered him, taking his place on the right.

Forward—march!

The whole ſtep off, and follow the leading diviſion or platoon; the officer who conducts the column receiving his directions from the commanding officer.

When the battalion wheels to the right, the left flank of the platoons muſt dreſs in a line with each other, and the contrary when they wheel to the left.

Battalion! Halt!

By platoons! to the left—wheel! march!

The wheeling finiſhed, each officer commanding a platoon or diviſion, orders

Halt! dreſs to the right!

Dreſſes his platoon, and takes poſt in the inter; the battalion being now formed in a line.

CHAP. X.

OF THE FORMATION AND EXERCISE OF A REGIMENT OR BATTALION OF ARTILLERY WITH FIELD PIECES.

As it is of importance that ſome general and uniform arrangement ſhould be eſtabliſhed in the artillery of the United States, I ſhall, with diffidence, ſuggeſt the following:

ARTICLE I.

That there be one maſter general of ordnance, who is commander in chief of the corps of artillery, and to have the direction of all the ordnance and ſtores, under the orders of the preſident, and to have the rank of major general in the armies of the union.

He ought to have an univerſal knowledge of tactics; be a great mathematician, and an able engineer; to know all the powers of artillery; to underſtand the attack and defence of fortified places, in all its different branches; how to diſpoſe of the artillery in the day of battle, to the beſt advantage; to conduct its march and retreat; as alſo to be well acquainted with all the apparatus belonging to the train, and to the laboratory, &c.

That there be an inſpector and ſurveyor general of ordnance, whoſe duty it ſhall be to inſpect the diſcipline of the corps of artillery, agreeable to ſuch uniform ſyſtem as may be eſtabliſhed, and to ſurvey all the ordnance and ordnance ſtores of the United States, annually, or oftener if neceſſary; and report the particular ſituation of them to the maſter general of ordnance; and to digeſt all the general returns of the corps of artillery, the ordnance and ordnance ſtores, *&c.* and to have the rank of lieut. colonel in the armies of the union.

That there be a vice maſter general of ordnance in each ſtate, who ſhall be commander in chief of the artillery in the ſtate, and have the direction of all the ordnance and ſtores, under the orders of the commander in chief of the ſtate, (or the executive power) and have the rank of brigadier general in the armies of the union.

That there be a deputy inſpector and ſurveyor general of ordnance in each ſtate, whoſe duty it ſhall be to inſpect the diſcipline of the corps of artillery, and ſurvey all the ordnance and ordnance ſtores, belonging to the ſtate, annually, or oftener if neceſſary; and report the particular ſituation of them to the vice maſter general of ordnance, and to digeſt all the general returns of the regiment of artillery and ordnance, alſo the ordnance ſtores, *&c.* and have the rank of major.

Note. It would be proper that the deputy inſpector and ſurveyor general ſhould make out, annually, four copies of the general returns of the ſtrength of the regiment, and all the ordnance, and the ſtores of the ſtate. One copy for the executive of the ſtate, one copy for the vice maſter general, one for the inſpector and ſurveyor general of the United States, and the remaining one for himſelf.

That the corps of artillery in each ſtate be formed into one regiment, divided into battalions; and ſuch battalions, when conſiſting of more than three companies, to be commanded by a lieutenant colonel, and a major, adjutant and quarter-maſter; and if not conſiſting of more than three companies, to be commanded by a major and two lieutenants to be taken out of the battalion, to do the duties of adjutant and quarter-maſter.*

Each battalion to have a muſic-major, who is to take charge of the drummers and fifers, &c. and inſtruct them in their various duties.

The exerciſe of a regiment or battalion with field-pieces.

As the number of companies which compoſe the battalion, and alſo the battalions which compoſe the regiment of artillery in each ſtate, depend on the local ſituation of the different ſtates, this will always make the numbers unequal.

Therefore, we will ſuppoſe a regiment to conſiſt of two battalions, and each battalion of four companies, which will man out not leſs than ſixteen field-pieces. The regiment or battalion being formed * in front of the park, the battalion conſiſting of four companies, the adjutant will divide them into eight platoons, and each platoon or ſection to be ſubdivided, and ſo on, according to the proportion of companies. The commanding officer will order

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* It may be objected by ſome, of the proportion of field and ſtaff-officers being greater than in the infantry; but whoever is acquainted with the great varieties which are comprehended in the duties of the artillery, muſt be ſenſible that they will have as much to do in the diſcharge of their duty as any field-officers in the ſervice. In the Britiſh ſervice, the royal regiment of artillery is compoſed of four battalions (and a captain of cadets, of which the maſter-general is always captain); each battalion commanded by a colonel, lieutenant colonel and major; the maſter-general of the ordnance is commander in chief; the lieutenant-general commander in ſecond; and the four colonels are called colonels commandants, each of his battalion, and have rank in the army at large agreeable to ſeniority of commiſſion.

Attention!

Caution.

Companies! take care to man out your reſpective pieces!

Platoons! to the right—wheel!

March!

Note, If it ſhould happen that the regimental or battalion parade is at ſome diſtance from the front of the park, they will march in this poſition till the battalion arrives in front of the pieces they are to exerciſe.

Platoons! to the right—turn!

March!

At this word of command the platoon officers advance to the right of their platoons, and conduct them to their reſpective pieces; then order each his platoon to oblique to the right and left, and form on each flank of the piece, and then order platoon or files to the right and left, face inwards! (toward the piece) as explained in chap. vii. art. 2. and man out the piece accordingly.

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* The captains take rank agreeable to Chap. ix.

When all is ready, and the adjutant hath divided the regiment or battalion into wings, grand diviſions, and ſub-diviſions, and ſo on, in proportion to the ſtrength of the regiment or battalion, then when the commanding officer will order

Forward—march!

(Or order.)

The drummers and fifers beat and play the grenadier's march, which is an invariable ſignal for the line to advance.

Signal of movements by the beat of the drum.

1ſt. For the whole line to advance. Grenadier's march.

2d. For the line to advance from the right by wings, the right in front. One flam and grenadier's march.

3d. By grand diviſions. Two flams and the grenadier's march.

4th. By ſub-diviſions. Three flams and grenadier's march.

5th. By ſingle pieces. Four flams and grenadier's march.

ART. III.

1ſt. For the line to advance from the left by wings, the left in front. One ſhort roll and grenadier's march.

2d. By grand diviſions. Two ſhort rolls and grenadier's march.

3d. By ſub-diviſions. Three ſhort rolls and grenadier's march.

4th. By ſingle pieces. Four ſhort rolls and grenadier's march.

ART. IV.

Signals for firing by the beat of the drum.

Caution.

Take care to fire!

1ſt. From the right to left of the line. One flam and preparative.

2d. By wings. Two flams and preparative:

3d. By grand diviſions. Three flams and preparative.

4th. By ſub-diviſions. Four flams and preparative.

ART. V.

Take care to fire!

1ſt. From left to right of the line. One ſhort roll,

2d. By wings. Two ſhort rolls.

3d. By grand diviſions. Three ſhort rolls.

4th. By ſub-diviſions. Four ſhort rolls.

ART. VI.

Take care to fire!

1ſt. From the center to the flanks of the line. Tow, row, dow, and one flam and preparative.

2d. By wings. Tow, row, dow : two flams and preparative.

3d. By grand diviſions. Tow, row, dow; three flams and preparative.

4th. By ſub-diviſions. Tow, row, dow; four flams and preparative.

ART. 7.

Take care to fire!

1ſt. From the flanks to the center of the the line. The laſt part of the tat-too, one flam and preparative.

2d. By wings. The laſt part of the tat-too, two flams and preparative.

3d. By grand diviſions. The laſt part of the tat-too, two flams and preparative.

4th. By ſub-diviſions. The laſt part of the tat-too, and preparative.

5th. To ceaſe firing: beat the general invariably.

The above ſignals of movement and firings, by the beat of the drum, are agreeable to the reſult of the field officers, convened by general KNOX's orders, at his quarters, in 1779, to form a plan for manœuvring a regiment with field pieces.

A regiment may, if the commanding officer pleaſes, form and diſplay the cloſe and open column and changing the front of the line, obſerving always that not leſs than two pieces can form a platoon. It would be needleſs here to give a further explanation, as it is fully illuſtrated in Chap. XV.

CHAP. XI.

THE DISPOSITION OF THE ARTILLERY IN THE FIELD.

At the opening of the campaign, the artillery is detached to the different parts of the army, in ſuch proportion as the commandant of the artillery, with the approbation of the commander in chief of the army, thinks requiſite.

As there are ſome officers, in all ſervices, whoſe promotion is rapid; and not having gained ſufficient experience to be fully acquainted with their duty, eſpecially when detached to brigades. For their inſtruction I preſent the following.

" Much is required from an officer of artillery, when on detachment, as he hath then the whole weight of duty on his mind.

" He muſt be careful in diſciplining and exerciſing his men, at leaſt three times a day; he muſt ſee that they keep themſelves clean, and will himſelf ſet them an example.

" He will particularly attend to the manner of the men's cooking of their proviſions, which ought always to be boiled or roaſted, never fryed, baked or broiled, which modes are very unhealthy; they muſt be taught to uſe vinegar freely.

" The officer muſt frequently examine his ammunition and air it; view his pieces, apparatus, the horſes and harneſs, and be ſure that every thing is in the moſt perfect order to move at the ſhorteſt notice, after he ſhall receive orders.

" The reputation and promotion of the officers, and that of the corps, will depend on the moſt punctual performance of their duty in every point; no excuſe will be admitted for any omiſſion.

" The orders of the day muſt be conſtantly taken by every officer commanding a detachment; and when the brigade manœuvres the artillery muſt be out, and exerciſe with them.

" The limbers belonging to the guns muſt not, on any pretence whatever, be taken for any other uſe, but always kept with them."*

All repairs of carriages and defects of horſes, harneſs, apparatus and ammunition, which may happen when the army marches to be attended to immediately on the halt of the army, ſo as to be in perfect order to move when they march again.

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* Gen. Knox's inſtructions to officers commanding artillery detached to brigades.

CHAP. XII.

OF THE DISPOSITION OF THE FIELD-PIECES ATTACHED TO BRIGADES OF INFANTRY.

The field pieces attached to the different brigades muſt always remain with them, encamping on their right, unleſs the quarter maſter general thinks proper to place them on any advantageous piece of ground in front.

When the army marches by the right, the field-pieces march at the head of their reſpective brigades; when it marches by the left, they follow in the rear, unleſs circumſtances determine the general to order otherwiſe; but, whether they march in front, center or rear of their brigades, they muſt always march between the battalions, and never between the platoons.

In manœuvring they muſt alſo follow their brigades, performing the manœuvres and evolutions with them; obſerving that, when the cloſe column is formed, they muſt always proceed to the flank of the column, oppoſed to that ſide, their brigade is to diſplay to; and on column's diſplaying, they follow the firſt diviſion of the brigade; and when that halts and forms, the field-pieces immediately take their poſts on its right.

CHAP. XIII.

OF THE MANŒUVRES AND EVOLUTIONS.

It is highly neceſſary that the artillery officers ſhould be acquainted with the manœuvres as eſtabliſhed for the army, as it will enable them to perform their duty when exerciſing with field-pieces, with a brigade of infantry; otherwiſe they will be liable to throw the infantry into confuſion through ignorance.

In order to remedy that evil, it will be neceſſary to obſerve the following; that a brigade general conſiſts of four regiments, which parade according to ſeniority of rank.

The proportion of field-pieces is generally two or three, according to the ſtrength of the brigade; when there is only two pieces, they are poſted, one on the right and the other on the left, as plate 6. fig. 1.

But when there are three pieces annexed they are poſted, one to the right, and left, and the third in the center of the brigade, as Plate 6, Fig. 2.

But the commanding officer of the brigade may alter the poſition of the artillery, under his immediate command, as he ſhall think neceſſary for the good of the ſervice. When formed with the brigade, the men at the drag-ropes are to dreſs with the line of the brigade.

The ammunition waggons, or tumbrels, are to be poſted in the rear of their reſpective pieces, ſo as to be handy to ſupply them with ammunition, and conform to the movements of the brigade, and alſo the limbers in the rear, ſo as to be handy for a movement, as occaſion may require.

It might be of advantage to poſt a truſty non-commiſſioned officer at each ammunition waggon or tumbrel, to ſee that proper ammunition is ſent to ſupply the piece, when firing; and direct the driver where to drive, as he ſhall receive orders from his commanding officer. The men at the ſide boxes of the piece, as ſpecified in Art. 8, of the manual exerciſe of field pieces.

When the artillery are poſted in the above manner, they are ready either for action, or to manœuvre with the brigade.

CHAP. XIV.

OF THE POINT OF VIEW, OR THE DIRECTION OF THE MARCH OF COLUMNS.

As the artillery generally marches at the head of the column, the officer commanding the artillery ſhould pay particular attention to make ſome diſtant object his point of view, the more conſpicuous the better, to determine the direction of the line of march.

For inſtance, ſuppoſe the line ſhould advance in two columns, the officers at the head of the columns, without taking a point of view in front, would be ſubject to incline to the flanks or to the center; either of thoſe inclinations would make a very great defect in the line, when the columns come to be diſplayed; therefore there cannot be too much attention paid to this object.

CHAP. XV.

OF THE FORMATION & DISPLAYING OF COLUMNS,

WITH

THE METHOD OF CHANGING FRONT WITH ARTILLERY & INFANTRY.

ARTICLE I.

THE cloſe column formed on the ground by the right, the right in front, the artillery to be poſted on the flanks of the line, &c.

Caution,

By the commanding officer,

Take care to form column by platoons by the right; the right in front!

To the right—face!

The whole face to the right, except the right platoon and artillery on the right of the line; at the ſame time, the officer commanding the artillery on the left (and center, if there are three pieces), gives the word

Unhook drag ropes!

The commiſſioned officers will fall in the rear of their pieces ſo as to direct them. The non-commiſſioned officers and matroſſes, who tend the vent and fire the pieces, face at the ſame time the word *unhook* is given, as ſpecified in the article of the manual exerciſe with field-pieces.

March!

The whole ſteps off with the quick ſtep, the artillery to march cloſe in rear of the preceding platoon of infantry, till they arrive to their place in column.

When the officer commanding platoons perceive their leading file dreſſed with that of the platoon already formed, commands,

Halt! front! dreſs!

And the platoon fronts and dreſſes to the right; the artillery officer at the ſame time commands

Unhook drag ropes! to the left turn!
Dreſs!

Which brings the piece on the left of the 8th. platoon, as Plate 7, Fig. 1; the limbers, tumbrels, or waggons, as Plate 6, Fig. 1.

ART. 2.

Diſplay of a column formed by the right, the right in front.

(Plate 7, Figure 1ſt.)

Caution,

By the commanding officer.

Take care to diſplay column to the left!

The officers commanding platoons go to the left, in order to conduct them; the officers of the artillery take poſt in front of the pieces, excepting that on the right of the line.

To the left—Face!

The whole face to the left, except the front platoon and piece, on the right of the line.

March!

The platoons face, ſtep off, and march obliquely to their places in the line; when the ſecond platoon has gained its former diſtance, the artillery on the left falls a little to the rear, ſo as to give room for the 8th. platoon to diſplay. At the ſame time its officer commands

Halt! front! to the right—Dreſs!

Dreſſes his platoon with that already formed, and takes poſt on the right; the other platoons form in the ſame manner. The artillery on the left marches obliquely till they gain ſufficient diſtance on the left of the line, and then commands

To the right! Turn!
Halt—Dreſs!

And dreſſes with the line.

ART. 3.

The cloſe column formed on the ground, by the left, the left in front.

(Plate 7, Fig. 2.)

This is formed in the ſame manner as the preceding column, only facing and marching to the left, inſtead of to the right. The officers will conduct their platoons, and having dreſſed them, return to their poſts on the right.

ART. IV.

Diſplay of a column formed by the left, the left in front.

(Plate 7. fig. 2.)

This column is uſually diſplayed to the right on the ſame principle as the column formed to the right is diſplayed to the left.

ART. V.

The cloſe column formed on the center or fifth platoon, the right in front.

(Plate 8. fig. 1.)

Caution.

Take care to form column on the fifth platoon, the right in front!

To the right and left—face!

The fifth platoon ſtands faſt, and the artillery which are poſted in the center of the line, on the right of the fifth platoon; the others face to the center: the officers poſt themſelves at the head of their platoons and break off.

The officer commanding the artillery on the wings, at the moment the infantry faces, commands:

Change drag ropes!

The commiſſioned officers will fall in the rear of the pieces, ſo as to direct them; the non-commiſſioned and matroſſes, who attend the pieces, face in the ſame manner as directed, each of them, in the manual exerciſe: See Chap. vi. & vii. And on receiving the word

March!

Each piece is to be conducted to its poſt in the column, always obſerving to follow their preceding platoon, viz. the artillery on the right of the right wing follow the firſt or right platoon; and on the left, the eighth or left platoon of the infantry.

When this column is to be formed with the left in front, in this the fourth platoon and artillery in the center ſtand faſt (being on the left of the fourth platoon); the pieces on the flanks are to form in the ſame manner as when the column is formed on the fifth platoon, the right in front, as plate 8. fig. 1.

In all formations and diſplayings, the officers march in the rear of their pieces, and as ſoon as they arrive to their poſition, the line or column then returns to the front of their pieces, and dreſs them with their preceding platoon.

Note. The platoon officers whoſe platoons march by the left, as ſoon as they have dreſſed their platoons in line or column, return to their poſts on the right.

ART. 6.

Diſplay of a column, having the right in front, from the center or fifth platoon.

(Plate 8, Fig. 1.)

Caution!

Take care to diſplay column from the center!

At this caution the officers of the platoons in front, poſt a ſerjeant on each flank of it, who is to remain there till the platoon on which the column diſplays, has taken its poſt in the line, when he retires along the rear of the battalion, to his platoon.

To the right and left—face!

The pieces on the right turn to the right, and the four platoons face to the right, the fifth platoon ſtands faſt,* and the ſixth, ſeventh and eighth faces to the left. The officer commanding the artillery on the left commands,

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* If there is artillery poſted in the center of the line, being on the right of the fifth platoon, it muſt ſtand faſt.

To the left—turn!

and inclines a little to the rear, ſo as to give room for the eighth platoon to diſplay.

March!

The artillery and four platoons of the right marches to the right, the artillery on the right taking care to march ſtraight to the point of view; as ſoon as the fourth platoon has unmaſked the fifth, its officer commands,

Halt! front! march!

And it marches up to its poſt in the line; the third and ſecond platoon, as ſoon as they have reſpectively gained their diſtances, proceed in the ſame manner; and then the firſt halt and dreſs, and when the artillery have gained their diſtance on the flank, commands,

To the left—Turn!

Halt! dreſs!

And dreſſes with the line of infantry: the fifth platoon in the mean time marches to its poſt, between the two ſerjeants,* and the three platoons and artillery of the left, forms, by marching obliquely to their poſts in the line, as before explained.

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* It will be neceſſary for the artillery on the right flank, when formed into a column, to poſt a ſerjeant on their right flank, as a point of view for the artillery on the right of the fifth platoon, or center of the line, to form by, and to prevent the fourth platoon from inclining too far to the center.

ART. VII.

The cloſe column formed by the right, the right in front, diſplayed to the right.

(Plate 9, Fig. 1.)

When a column is formed by the right, and the nature of the ground will not permit its being diſplayed to the left, it may be diſplayed to the right in the following manner.

Caution.

Take care to diſplay column to the right!

The two ſerjeants are to be poſted, as before, on the flanks of the front platoon.

To the right—face!

The artillery on the left and eighth platoon ſtands faſt, the reſt face to the right; the artillery commands,

To the right—turn!

And march the piece on the right flank, keeping the line; the artillery and platoons following to their places in the line; as ſoon as the eighth platoon is unmaſked it marches forwards, with the artillery on the left flank, to their poſt; the platoon paſſes between the two ſerjeants of the firſt platoon left there for that purpoſe; the ſeventh platoon having gained its diſtance, halts, fronts, and marches to its ground; the other platoons proceed in the ſame manner as explained in the diſplay from the center; when the artillery hath gained their ground in the line, commands,

To the left—turn! forward march!

When they arrive to their poſt in the line of infantry, Halt! Dreſs! and dreſſes with thoſe already formed.

ART. VIII.

The cloſe column formed by the left, the left in front, diſplay to the left.

(Plate 9. fig. 2.)

This is performed on the ſame principles as the diſplay of the column in the ſeventh article.

A column formed either by the right, left or center, may, according to the ground, or any other circumſtances, be diſplayed on any particular platoon, on the principles before explained.

ART. IX.

Of open columns.

They are performed by wheeling to the right or left by platoons, and diſpenſibly neceſſary, by marching the platoons by files in the following manner:

Caution.

Take care to form open column by the right!

(*Plate* 10. *fig.* 1.)

To the right—face!

The artillery on the right of the line and right platoon ſtands faſt, the reſt face to the right; at the ſame time the infantry is ordered to face; the officers which command the pieces of artillery in the center and left of the line.

To the right—turn! march!

Each piece follows their preceding platoon to its place in the line.

To the left—turn!

And dreſs with their reſpective platoons, paying the greateſt attention to preſerve a proper diſtance between the platoons.

(Plate 10, Fig. 2.)

Open columns may in the ſame manner be formed by the left, center, or any particular platoon, by wheeling by platoons, or by cloſing the column, and diſplaying, as explained in the article of cloſe column.

If the commanding officer chooſes to cloſe the column, he will command

Cloſe—column! March!

On which the platoons march by the quick ſtep, and cloſe to within two paces of each other, the artillery with their reſpective platoons, and dreſs with them, when the commanding officers of the platoons and infantry ſucceſſively command

Halt! Dreſs, to the right!

And the column is cloſed.

When the commanding officer chooſes to open a column, he commands,

Open, column!

On which the front platoon, and the piece of artillery on the right of the line, advances, followed by the others ſucceſſively, as faſt as they have their diſtances; the artillery always dreſſed with their reſpective platoons.

The different ways of forming and diſplaying column, being the baſis of all manœuvres, requires the greateſt attention of both officers and men in the execution.

The officers muſt, by frequent practice, learn to judge of diſtances with the greateſt exactneſs; as an augmentation or diminution of the proper diſtance between the platoons and the artillery, is attended with much confuſion, in forming a line: the artillery, as well as infantry, muſt alſo be very careful not to advance beyond the line, in forming a battalion ; but dreſs the artillery and platoons of infantry carefully, with the point of view.

ART. 10.

Of changing the front of a line.

The changing the front of a platoon, diviſion, or even a battalion, may be performed by a ſimple wheeling. The artillery has only to wheel on its own ground, which forms the pivot, and the ammunition waggons or tumbrels, are to be driven through, between the piece of artillery, into the rear of the line, ſo as not to interfere with the infantry.

That of a brigade muſt be performed by firſt forming the open column, then marching it into the direction required, and forming the line.

In this manœuvre the artillery is to be kept dreſſed with their reſpective platoons, and inclining according to the direction of the march of the column, wheeling with the platoon they dreſs with, when they wheel.

If it be neceſſary to change the front of a line conſiſting of more than a brigade, the moſt ſimple and ſure method is, to form a cloſe column, either by brigades or battalions, and march them to the direction required and diſplay.

In this the artillery forms on the flanks of the column, as above directed.

CHAP. XVI.

OF THE MARCH OF COLUMNS.

The march of columns is an operation ſo often repeated, and of ſo much conſequence, that it muſt be conſidered as an eſſential article in the inſtruction of both officers and men.

ARTICLE I.

The march of an open column.

Column! march!

The whole column muſt always begin to march, and halt at the ſame time, and only by order of the commanding officer.

After the firſt twenty paces, he ſhould command,

Support—arms!

When the men may march more at their eaſe, but keeping their files cloſe, the officer commanding the pieces of artillery orders,

Slope—ſpunge!

The matroſs who carries the ſpunge ſlopes it; the officers of artillery ſhould be very careful to preſerve a proper diſtance between the pieces and infantry, and conform to the manœuvres of the line, always keeping the ammunition waggons or tumbrels as compact as poſſible.

Before the column halts, the commanding officer ſhould command

Carry—Arms! column, halt!

Dreſs to the right!

The artillery officer orders

Carry—ſpunge!

When marching in open column, the officer commanding will often form battalion, by wheeling to the right or left, in order to ſee if the officers have preſerved the proper diſtance between the platoons.

The officer commanding the artillery will command,

Unlimber—pieces!

And wheel the artillery with the battalion and dreſs; the limbers and ammunition waggons or tumbrels to dreſs in the rear of their reſpective pieces.

ART. II.

Of columns changing the direction of their march.

When a cloſe column is obliged to change the direction of its march, the front platoon muſt not wheel round on its flank, but advance in a direction more or leſs circular, according to the depth of the column, that the other platoons may follow.

The commanding officer of artillery will be very careful in preſerving his proper diſtance in marching in a circular direction, ſo that he may not interfere with the march of the infantry.

(*See plate* II. *fig.* I.)

An open column changes the direction of its march by wheeling the front platoon, the others following; in doing which, the officers commanding platoons muſt be particularly careful that their platoons wheel on the ſame ground with the front platoon and artillery; for which purpoſe a ſetjeant ſhould be left to mark the pivot on which they are to wheel. The artillery is to be very careful to dreſs with their reſpective platoons of infantry in wheeling.

ART. 3.

Paſſage of a defile by a column.

(Plate 11, Fig. 2.)

A column on its march coming to a defile, which obliges it to diminiſh its front, the officer commanding the firſt platoon commands

Break off!

The artillery on the flank of the front platoon, on the entrace of the defile advances in front of the column, till they get through the defile on which thoſe files which cannot paſs break off, face inwards and follow their platoon by files, and as the defile narrows or widens, more files break off or join the platoon. The ſucceeding platoons proceed in the ſame manner; the artillery in the center and rear: the ammunition waggons or tumbrels, of the front and center pieces, fall into the rear of their reſpective pieces, excepting thoſe in the rear of the column, which falls in their front.

If the defile is difficult or long, as ſoon as the front has paſſed and gained ſufficient, they will halt till the whole have paſſed and formed, when they will continue the march.

ART. IV.

A column croſſing a plain liable to be attacked by cavalry.

(Plate 12. fig. 4.)

When the commanding officer thinks himſelf in danger of being attacked by cavalry, he muſt cloſe the column, and on their approach halt and face outwards; the front platoon ſtanding faſt, the rear platoon going to the right about, and the others facing outwards from their centers.

In caſe of attack, the two firſt ranks keep up a ſmart running fire, beginning as well as ending by a ſignal from the drum.

The ſoldiers muſt be told that under theſe circumſtances, their ſafety depends wholly on their courage, the cavalry being only to be dreaded when the infantry ceaſe to reſiſt them.

In this ſituation all parts of the army are bound in duty to aid and ſupport each other in repelling the force of the enemy, as their ſafety depends on a mutual exertion in all the different corps which compoſe the army. The artillery detached with the infantry requires the ſerious attention of the commanding officer, not only from the importance of their ſervice in annoying the enemy, but the loſs his country ſuſtains by their capture.

He ſhould form ſuch a diſpoſition of his troops, as that every part ſhould be able to exert itſelf and be equally covered, as circumſtances will admit.

The cloſe column, in this ſituation, is well calculated for the protection of a body of infantry: but that of artillery, with their ammunition carriages, is left entirely expoſed to the charge of the enemy, excepting the reſiſtance they are able to make.

In this caſe, if the troops were to form the hollow ſquare, where there are artillery detached, the ammunition, &c. would be ſecured by their protection.

The field pieces poſted on the right of the front platoon, with their flanks by the infantry, to ſecure the men at the guns on a charge—which piece would be able, at long ſhot, to injure them, and on a near approach, firing obliquely with caniſter or grape ſhot, would ſorely rake the enemy, either on their charge of the head or right flank of the column or ſquare: the piece on the left would defend the rear and left flank of the column in like manner.

(See plate 12. fig. 2.)

Caution.

Take care to form the hollow ſquare!

At this caution the officers poſt themſelves ſo as to lead their platoon.

March!

The front platoon will move on very ſlow, the ſecond will march with the oblique ſtep to the left, till they gain the left of the firſt platoon and dreſs by them, which will form the front of the ſquare.

The third and fourth platoons will, at the ſame time, face to the right, wheel by files, and march up in a line with the right flank of the head of the ſquare. The fifth and ſixth platoons will, at the ſame time, face to the left, and wheel in the ſame manner and form the left flank of the ſquare. The ſeventh platoon marches obliquely to the left, ſo as to unmaſk the eighth platoon, which marches directly forwards and dreſſes with the ſeventh and forms the rear of the ſquare.

The platoons will then break off a few files for the ammunition carriages, &c. to paſs into the hollow of the ſquare, and immediately cloſe up the files. The artillery on the right keeps its poſt in the corner of the ſquare, the piece on the left will wheel to the left, and form on the left of the ſeventh platoon or left angle of the ſquare.

If there ſhould be a third piece, *&c.* in the center of the line, this ſhould be as a reſerve and opened on the enemy where the greateſt force of their charge may happen. The light infantry ſhould be the covering to the artillery, being a detached corps. See it further by the plate.

If the hollow ſquare is to halt and receive the charge, the commanding officer orders,

Square, halt!

To the right and left—Face, outwards!

The head of the ſquare ſtands faſt, the right flank faces to the right, and the left faces to the left; the rear of the ſquare faces to the right about, and cloſe the ranks as compact as the uſe of fire arms will poſſibly allow. In this poſition they are ready to receive the enemy.*

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* Thus march, and thus receive the charge of the enemy, and they will ſoon grow weary of having any thing to do with you.

Charles XII. the brave king of Sweden, with 8.000 horſe, himſelf at the head of them, attacked a body of between 5 and 6.000 Saxon foot, commanded by general Schulenberg, in the plains of Poland, drawn up in one ſquare body. He firſt gave a furious charge to one front only, and was gallantly repulſed: after that the king attacked every front at once, with the greateſt vigor, but was again beaten off. This gave the monarch and his cavalry enough of it; and Schulenberg, by favor of the night, paſſed a rivulet, and leaving ſome foot in a mill, the fire of which detered the enemy, he made a ſafe retreat, *Note*, The oblong ſquare may be formed on a ſimilar principle, making only one platoon each the head and rear of the ſquare, the ſecond platoon forms on the head of the right flank, and the ſeventh platoon on the rear of the left flank, as plate 12. fig. 3.

When the ſqnare is to continue its march, it may be done by the flanks facing to the right and left; and the rear facing to the right about.

But if the ſquare is to be reduced to a column, the officer commands

Caution !

Take care to form column !

At this caution the officers will poſt themſelves ſo as to lead their reſpective platoons.

The chevalier Foland obſerves, "When you attack, march up to the enemy with as quick a pace as good order will allow: it gives ſpirits to your troops, and fear to the enemy: a ſlow motion allows too much time for reflection, damps their courage, and expoſes them too much to the enemy's fire. But take care to march in even front.

If you command a body of foot in a plain, and are likely to be attacked by a ſuperior number of horſe, throw your foot into a ſquare; let your officers be in the front, with their eſpontoons, and the ſoldiers with their bayonets preſented to the enemy, having their files well cloſed, ſo as to make the whole body as compact as the uſe of their arms will allow."

Extracted from Military Memoirs and Maxims, by Gen. Wilkinſon.

March!

The front, or firſt platoon, will march directly forward with a briſk ſtep; the ſecond platoon will march obliquely to the right, till they cover the firſt platoon; its officer will then order forward march.

The third and fourth platoons will face to the left, and wheel by platoons to the right; when the wheel is performed, their reſpective officers order, forward, march!

The fifth and ſixth platoons face to the right, and each platoon wheels to the left, and marches obliquely to the right till it covers thoſe already formed in front, then their officers order, Forward, march!

The ſeventh platoon marches only obliquely to the right till they gain the line of the column and alſo march forward. The eighth platoon marches directly forward; the artillery march to their poſt in column.

Note, If the battalion were marching in line, and liable to be attacked by cavalry, and ſhould it be neceſſary to form the hollow ſquare for the ſecurity of the ammunition, &c. it would be beſt to form the head of the ſquare on the center platoons, viz. the fourth and fifth and the third and ſecond would form the right flank, and the ſixth and ſeventh the left flank of the ſquare; the ſecond and eighth platoons would form the rear.

To form the line again, the right flank has only to face to the right, and wheel to the left, and dreſs with the center platoons. The left flank faces to the left and wheels to the right, and dreſſes; the ſecond marches obliquely to the right till it gains the right of the line, and dreſſes; the eighth platoon marches in the ſame manner to the left.

A column formed on any platoon in front may be reduced to the hollow ſquare, and formed again into column, agreeable to the above cited principles, being very expeditious and eaſy to be performed, which is preferable in a critical ſituation.

When the column is to continue its march, the officer commands,

Column! to the front—face! march!

The platoons face to the front, and march.

ART. V.

A column marching by its flanks.

Column! to the $\left\{\begin{matrix}\text{right}\\\text{left}\end{matrix}\right\}$ face!

If the column marches by the left, the officers go to the left of their reſpective platoons.

The artillery on the left of the column will, when orders are given, face to the left, and march ſo as to fall on the flank, and then face to the right and dreſs with the then front of the column; the piece on the right will march obliquely, and gain the right flank in the ſame manner.

March!

The column marches, dreſſes by the right.

Column! halt! front!

The column faces to the front, the artillery take their former poſition in column.

CHAP. XVII.

THE MARCH IN LINE.

ARTICLE I.

The march to the front.

Battalion! forward!

At this caution the enſign with the colours advances ſix paces; the ſerjeant who covered him taking his place. The whole are to dreſs by the colors.

The commandant of the battalion will be poſted two paces in front of the colours, and will give the enſign an object to ſerve as a direction for him to march ſtraight forward.

March!

The enſign who carries the colors will be careful to march ſtraight to the object given him by the col. to do which he muſt fix on ſome intermediate object. The artillery in this operation muſt be very careful to keep dreſſed with the line, and preſerve their proper diſtance from the infantry.

If many battalions are in line, the enſigns muſt dreſs by the enſign in the center; if only two, they dreſs by each other. They muſt be very careful not to advance beyond the battalion they are to dreſs by, it being much eaſier to advance than to fall back.

Should a battalion by any cauſe be hindered from advancing in line with the reſt, the enſign of that battalion muſt drop his colors, as a ſignal to the other battalions, (who might otherwiſe ſtop to dreſs by them) not to conform to their movements; the colors to be raiſed again when the battalion has advanced to its poſt in the line ; and if, by ſome obſtacle, the march of any of the pieces ſhould be impeded, as ſoon as they have got through, they are to march briſkly, till they gain their place in the line, and dreſs, being alſo governed by the colors.

The commanding officer of each battalion muſt be careful that his men dreſs, and keep their files cloſe ; and he muſt preſerve the proper diſtances between his own battalion and thoſe on his flanks ; and when he finds he is too near the one or the other, he muſt command,

Oblique—to the { Right ! / Left !

When the battalion will march by the oblique ſtep, as ordered, till they have recovered their diſtance : The artillery will conform thereto, and preſerve their diſtance from the line of infantry, and receive the command

Forward!

Upon which the battalion and artillery will march forward, and the enſign take a new object to march to.

If the diſtance is augmented or diminiſhed only two or three paces, the commanding officer will order the colors to incline a little and then march forward ; the battalion and artillery conforming to their movements.

The officers commanding platoons and the artillery will continually have an eye over them, immediately remedying any defect, carefully dreſſing with the center, and keeping ſtep with the colors.

The officers in the rear of the platoons or pieces of artillery muſt take care of the ſecond rank, and pay particular attention in remedying any defect of the artillery in a low voice, and with as little noiſe as poſſible.

The ſoldier muſt not advance his ſhoulder out of the ranks oppoſite the ſide he dreſſes to; he muſt not croud his right or left hand man, but give way to the preſſure of the center, and reſiſt that of the wings; he muſt have his eyes continually fixed on the colors, turning his head more or leſs in proportion to his diſtance from them.

The matroſſes at the drag ropes muſt be very careful to advance in ſuch manner as to keep the pieces always dreſſed with the line of infantry, obſerving to govern the extending of their ſtep, to the ſituation of the ground.

The gunners who guide the pieces by the tiller, or trail ſpike, muſt be very attentive in the diſcharge of this duty, and obſerve that they do not crowd on the infantry, or that one piece ſhould not interfere with the other; but inclining either to the right or left, in proportion to that of the infantry, ſo as to preſerve their proper diſtances from them.

Battalion, halt!

The whole ſtop ſhort on the foot then advanced.

Dreſs to the right!

The men dreſs to the right, and the colors fall back into the ranks; the men at the drag ropes fall back alſo, and dreſs with the line.

ART. II.

Of the charge with bayonets.

The line marching, the commanding officer on approaching the enemy, commands,

March! March!

On which the whole advances by the quick ſtep.

Charge—bayonets!

The line charge their bayonets and quicken their ſtep; the drums beat the long roll, and the officers and men muſt take care to dreſs to the center, and not croud or open their files; and the officers and matroſſes muſt be very attentive in this part of duty, and conform to the movements of the infantry; and if circumſtances will admit, keep up a well directed, quick fire, with caniſter or grape ſhot, in different oblique directions, ſo as to annoy the enemy as much as poſſible.

The drivers muſt be very alert in their duty, and conduct the ammunition waggons and tumbrels, and alſo the limbers, in ſuch direction as ordered by the commanding officer of the artillery.

Battalion! ſlow ſtep!

The battalion and artillery falls into the ſlow ſtep.

Halt! dreſs to the right!

The battalion and artillery halts, and dreſſes to the right.

ART. III.

Method of paſſing any object in front of a line.

(Plate 11, *Fig.* 2.*)*

When an obſtacle preſents itſelf ſo as to impede the march of the pieces, the commanding officer of artillery will order,

Break off! and advance by ſingle pieces!

The limbers and ammunition waggons, or tumbrels, will break off in like manner, and after paſſing the obſtacle, they are to take their former poſition in the line.

And if the obſtacle ſhould happen before any diviſion, platoon, or number of files, the officer commanding the platoon, &c. commands,

Break off!

On which the files obſtructed face outwards from their center, and follow by files the platoons on their right and left; if the platoons on the wings are obſtructed, they will face inwards, and follow in the ſame manner.

In proportion as the ground permits, the files will march up to their places in front, dreſs, and take ſtep with the colors.

ART. IV.

Paſſage of a defile in front, by platoons.

A battalion marching and meeting with a bridge, or defile, over, or through which not more than the front of a diviſion can paſs at a time, the commanding officer orders,

Halt!

The artillery on that part of the line where the defile preſents, is to advance firſt into the defile briſkly, and if an enemy appear to obſtruct the paſſage, the artillery is to commence a well directed fire, advancing to cover the infantry, while paſſing and forming; and then the two platoons before whom the defile preſents itſelf.

March!

(*Plate* 13, *Fig*. 1.)

On which they paſs the defile in one diviſion.—As ſoon as thoſe two platoons have marched, the commanding officer orders,

To the right and left—Face!

The artillery and platoons on the right face to the left, and thoſe on the left face to the right.

March!

They march till they join, fronting the defile; when the commanding officer of the artillery, and the two platoons commands,

Halt! front! march!

As ſoon as the artillery and front diviſion has paſſed, they will halt, and the other diviſions, as faſt as they arrive in the rear, face outward and march by files till they come to their proper places in battalion; when the commanding officer of the artillery and platoons orders,

Halt! front! dreſs!

The commanding officer may form the line, or march in column, as he ſhall think neceſſary.

ART. V.

Paſſage of a defile in front, by files.

(*Plate* 14, *Fig*. 2.)

If the defile will not permit more than four files to paſs, the four files before which the defile preſents itſelf, enter without any word of command; the reſt face inwards and follow them—the whole marching through by files.

As ſoon as the files which firſt entered have paſſed they halt; the others, as faſt as they paſs, marching to their places in battalion.

In this ſituation, if an enemy ſhould appear, and attempt to obſtruct the paſſage, the artillery (if the defile ſhould be a bridge or cauſeway) may anſwer a very good purpoſe, in annoying the enemy at long ſhot, by poſting the pieces on an advantageous ſituation.

But if the defile ſhould be through a narrow valley, a hedge or woods, it would be proper for the pieces of artillery to enter the defile, at the head of the column; by which means they might fire at long ſhot, and on a nearer approach ply them well with caniſter ſhot; the ammunition carriages ſhould march in the rear of the pieces in front of the infantry.

ART. VI.

Of the march in retreat.

Battalion, to the right about—Face!

The whole face to the right about; the officers keeping their poſts.

Forward—march!

The colors advance ſix paces, and the whole ſtep off, dreſſing by them.

At the ſame time that the infantry faces to the right about, the commanding officer of artillery commands

Change—drag ropes!

And then retreat, keeping the pieces dreſſed in a line with the troops: the limbers and ammunition carriages are to wheel about and march off with the army.

In this part of duty the teamſters muſt be very attentive to obey ſuch orders as they ſhall receive from their commanding officer.

The paſſage of any obſtacle in retreat, is the ſame as in the march to the front.

ART. VII.

Paſſage of a defile in retreat, by platoons.

(Plate 14. fig. 1.)

If it is at any time neceſſary to paſs a defile in rear, in preſence of an enemy, the line muſt march as near as poſſible, to the defile; when the commanding officer orders

To the front—Face!

From the wings, by platoons, paſs the defile in the rear!

If there is an advantageous piece of ground on the other ſide of the defile, ſituated ſo as to command the defile and cover the troops in paſſing it, the artillery will retire through the defiles and poſſeſs themſelves of the ſtrong ground, and commence a well directed fire, ſo as to retard the progreſs of the enemy in harraſſing the troops paſſing the defile.

But if no advantageous ſituation through the defile, the artillery will paſs the defile in rear, and keep up a well directed quick fire with round ſhot, and on a nearer approach with caniſter ſhot. In this ſituation the officer commanding the artillery will order his ammunition carriages to paſs the defile firſt, and alſo the limbers, and to attend that the ſide-boxes of the pieces are properly ſupplied with ſuitable ammunition.

The two platoons of infantry on the wings, face outwards.

March!

The two platoons wheel by files and march along the rear of the battalion to the entrance of the defile; where, joining, their officers commands,

Halt! to the $\left\{\begin{matrix}\text{right}\\ \text{left}\end{matrix}\right\}$ Face!

The platoon of the right wing faces to the left; the other platoon faces to the right, and both paſs in one diviſion, the other platoons following in the ſame manner, except thoſe of the center.

The artillery officer will order his piece to wheel outward to the flank of the line, then commands

Change—drag ropes!

The men at the drag ropes unhook from the wheel and hook at the trail, and retire along the line to the center platoon, as the other platoons file off; then orders

Change—drag ropes!

From the trail to the wheels, and wheels the pieces to the front taking poſt on the flank of the center, or the platoon which paſſes the defile laſt.

When all have entered, but the two center platoons, that on the right faces to the right about, and marches twenty paces into the defile; when the officer of the infantry commands

Halt! to the right about—Face!

The officer of the other platoon, when he ſees them faced, will retire in the ſame manner, and having paſſed twenty paces beyond the platoon halted in the defile, comes alſo to the right about: they continue in that manner to cover each others retreat, till they have paſſed, when they face to the front, and cover the defile.

The officer commanding the artillery will pay particular attention in obliquing his pieces to the right or left, ſo as not to interfere with the platoons in their defence; if the ſituation of the ground will admit, the artillery will commence a briſk fire on the enemy, in order to cover the rear, the pieces are to keep dreſſed with the rear platoon.

The three platoons of the right wing wheel to the left, and thoſe of the left wing wheel to the right; and having gained their proper diſtances, the artillery will take their former poſition in the line, then the commanding officer orders,

Halt!—Platoons!

To the right and left—wheel! march!

The right wing wheels to the left, and the left to the right; which forms the battalion.

If the defile ſhould preſent itſelf behind any other part of the battalion, the platoons fartheſt off muſt always retreat firſt; and if the defile becomes narrower than at the entrance, the platoons muſt double behind each other.

ART. VIII.

Paſſage of a defile in retreat, by files.

(*Plate* 14, *Fig.* 1, 2.)

This manœuvre is performed in the ſame manner as the preceding, except that inſtead of forming at the entrance, the platoons paſs by files; and having paſſed, face to the right and left, march till they have their proper diſtances and then wheel and form battalion.

The paſſage of defiles may be executed at firſt in common ſtep, for the inſtruction of the troops; in ſervice, always in the quick ſtep.

The paſſage of defiles being difficult in preſence of an enemy, the officers muſt be particularly careful to keep the files cloſed, to be quick in giving the words of command, and not loſe any time in the execution; and the artillery in this manœuvre have an opportunity in ſhewing their addreſs by taking poſſeſſion of the moſt advantageous piece of ground in the vicinity of the defile, and in ſerving the pieces well, and pouring on the enemy a briſk fire, properly directed, will annoy and keep them back; the manœuvre ſhould always be covered alſo by a party of light infantry or riflemen poſted on each ſide of the defile in the moſt advantageous ſituation to annoy the enemy.

ART. IX.

Method of paſſing the front line to the rear.

(Plate 15, fig. 1, 2.)

The firſt line being obliged to retreat, will face to the right about, and retire in line.

The ſecond line, if not already formed in columns, will immediately, on perceiving the firſt line retire, form in that order by brigades or battalions; the artillery officers muſt be very careful in this movement to keep the ammunition carriages in a compact ſituation, ſo as not to interfere with the retiring line: the artillery in the retiring line will improve every favourable opportunity which preſents (taking care not to impede the retiring) by keeping up a briſk fire in rear; the ſecond line will diſplay; or, if cloſely preſſed by the enemy, attack in columns the flanks of the battalions which purſue, thereby giving time for the firſt line to form and take a new poſition. In this caſe a great deal is to be expected from the artillery officers: activity in endeavouring to retard the enemy's progreſs by a briſk fire, and to make ſuch movements with his pieces and ammunition carriages as not to entangle them with the troops, which will have a tendency to throw the line into confuſion, and injure the reputation of the artillery; as there is ſuch a variety of circumſtances in this caſe as will produce different movements, therefore the artillery officer muſt exerciſe great preſence of mind and prudence, and obſerve every movement of the troops, and conform thereto.

In this chapter I have tranſcribed the principal part of the Baron's obſervations, as it was neceſſary in blending the artillery duty with that of the infantry, as it is of importance to the public that the officers ſhould be mutually acquainted with the duty of each other, as in actual ſervice it will enable them to act in concert.

CHAP. XVIII.

OF THE FIRINGS.

When the troops are to exerciſe with powder, the officers muſt carefully inſpect the arms and cartridge-boxes, and take away all the cartridges with ball.

When the artillery are to exerciſe with the infantry with powder, the officers are to caution the men to perform in loading, every motion diſtinct, in order to prevent accidents; the gunner who fires the piece off is not to attempt to fire the piece until the men who ſpunge and charge the piece are clear of the muzzle and returned to their poſt, as poſition 3d. art. 4th. of the manual exerciſe.

The ſide-boxes of the carriage are to be taken off, and carried during the firing, as ordered in the manual exerciſe, art. 8th.

The firſt part of the general will be the ſignal for all firing to ceaſe; on the beating of which the officers and non-commiſſioned officers muſt ſee that their platoons ceaſe firing, load and ſhoulder as quick as poſſible. The commanding officer will continue the ſignal till he ſees that the men have loaded and ſhouldered.

ARTICLE I.

Firing by battalion.

Caution,

Take care to fire by battalion!

Battalion! make ready! take aim! Fire!

The artillery on the right of the line, at the word *make ready*, will fire their piece, and the pieces on the left will fire in ſucceſſion after the battalion on the right has fired.

If there be more than one battalion to fire, they are to do it by ſucceſſion from right to left; but after the firſt round, the odd battalions fire as ſoon as the reſpective battalions on their left begin to ſhoulder, and the even battalions fire when the reſpective battalions on their right begin to ſhoulder.

Note, The artillery will fire as a diſtinct body in rotation with the battalions.

ART. II.

Firing by diviſions and platoons.

Caution,

Take care to fire by diviſions!

Diviſions! make ready! take aim! Fire!

They fire in the ſame order as is preſcribed for the artillery and battalions in art. 1.

The firing by platoons is alſo executed in the ſame order in the wings of the battalion, beginning with the right of each; that is, the firſt and fifth platoons give the firſt fire, the ſecond and ſixth the ſecond fire, and the fourth and eighth the fourth fire. The artillery on the right will commence the fire, as art. 1. but the artillery on the left will fire next after the fourth and eighth platoon have fired; after which, they fire as before preſcribed.

ART. III.

Firing advancing.

The battalion advancing receives the word,

Battalion! halt!

Take care to fire by diviſions!

They fire as before.

ART. IV.

Firing retreating.

When a battalion is obliged to retire, it muſt march as long as poſſible; but if preſſed by the enemy, and obliged to make uſe of its fire, the commanding officer will order,

Battalion! Halt!

To the right about—Face!

And fire by battalion, diviſion, or platoon, as before directed.

CHAP. XIX.

OF THE MARCH OF AN ARMY OR CORPS, & THE ARTILLERY.

THE baron Steuben obſerves, that the greateſt attention, on the part of the officers, is neceſſary at all times, but more particularly on a march; the ſoldiers being then permitted to march at their eaſe, with their ranks and files open; without the greateſt care, theſe get confounded one with another, and if ſuddenly attacked, inſtead of being able to form immediately in order of battle, the whole line is thrown into the utmoſt confuſion.

The orders for the march of an army being given, the adjutant general will appoint the neceſſary arrangement for guards.

They, together with a pioneer from each company, and a ſerjeant from each regiment, to conduct them, muſt be warned the evening before.

The officer commanding the artillery ſhould be very attentive that his artillery is in the moſt perfect order, either for a march or action.*

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* He ſhould attend that he has his complement of horſes to draw the pieces and ammunition carriages. It may not be improper to ſtate the number which are neceſſary to draw the pieces, ammunition waggons, &c.

It is commonly ſuppoſed that a horſe can draw about three hundred pounds weight for a length of time. Many curious and uſeful obſervations are to

Moſt generally when the army is to march, it is announced by a ſignal of the diſcharge of a piece of artillery at the park, or the flight of ſome rockets; on which the drums beat the general. The troops are immediately to ſtrike their tents and load the waggons, which muſt then fall into the line of march for the baggage.

At the beating of the Aſſembly, the troops will aſſemble and be formed into battalions on their reſpec-

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be found in De Sagulier's experimental philoſophy, ſome of which may be pertinent to the preſent ſubject: He obſerves, concerning the comparative ſtrength of men and horſes, that the beſt way of applying them: " A horſe draws with the greateſt advantage when the line of direction is level with his breaſt; in ſuch a ſituation he is able to draw 200lb. eight hours a day, walking about two miles and a half an hour.

And if the ſame horſe is made to to draw 240lb. he can work but ſix hours a day, and cannot go quite ſo faſt. On a carriage, indeed, where friction alone is to be overcome, a middling horſe will draw 1000lb.

But the beſt way to try a horſe's force, is by making him draw up a well, over a ſingle pully or roller; and in ſuch caſe, one horſe with another will draw 200lb. as already obſerved.

Five men are found to be equal in ſtrength to one horſe, and can, with as much eaſe, puſh round an horizontal beam of a mill, in a walk 40 feet wide; whereas three men will do it in a walk only 19 feet wide.

The worſt way of applying the force of a horſe is to make him carry or draw up hill: for if the hill be ſteep, three men will do more than a horſe, each man tive parades, and the guards conducted to their poſts. The artillery detached from the park advances to the right of their reſpective brigades of infantry.

The ſignal for marching being given, the whole will wheel by platoons or ſections, as ſhall be ordered,

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climbing up faſter with a burden of 100lb. weight, than a horſe that is loaded with 300 lb. a difference which is owing to the poſition of the parts of the human body being better adapted to climb than thoſe of a horſe.

On the other hand, the beſt way of applying the force of a horſe, is an horizontal direction, wherein a man can exert leaſt force: thus a man weighing 140lb. and drawing a boat along by means of a rope coming over his ſhoulders, cannot draw above 27lb. or exert above one ſeventh part of the force of a horſe employed to the ſame purpoſe.

The very beſt and moſt effectual poſture in a man, is that of rowing; wherein he not only acts with more muſcles at once, for overcoming the reſiſtance, than in any other poſition; but as he pulls backwards, the weight of his body aſſiſts by way of a lever."

And on ſuch like experiments we may be able to calculate the number of men or horſes neceſſary in moving the artillery; but before we can compute the number of horſes, we muſt know the weight of each piece. See the conſtruction of guns; from whence it appears, agreeable to Mr. Muller, that a 3 pounder requires but one horſe, a 6 pounder two, a 12 pounder three, and a 24 pounder ſix, of the light ſort; and the heavy 3 pounder four horſes, the 6 pounder ſeven, the 12 pounder ten, and the 24 pounder ſeventeen or eighteen horſes.

Therefore, the number of horſes for a ſet of light pieces is twelve, and the number for a ſet of heavy, and begin the march with the detached artillery at the head of the brigades.

On beating the long roll the whole are to form. The ſignals for halting, marching ſlower and quicker, muſt be given by the beat of the drum.

If the country will not admit of two pieces marching abreaſt of each other, they muſt break off and follow the front piece, and the artillery-men which march in ſections to break off the files in proportion as the road or paſs narrows or widens.

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thirty-eight, which is above three times as many as the former.

We may imagine how much expenſe is ſaved by making uſe of theſe light pieces in a campaign, in this article alone. See the conſtruction of guns.

It muſt be obſerved, that though horſes may draw ſuch a weight upon a common carriage, when the draught is in a direction with the horſe's breaſt, yet thoſe are very injudiciouſly contrived, and the draught very diſadvantageous, as will be ſhewn in the conſtruction of limbers.

But in America a larger proportion of horſes will be required, as the ground, in many places, is very uneven; and we find it neceſſary, by experience, in our country, to have for a light 3 pounder, two horſes, and a 6 pounder three horſes, and ſo on in proportion nearly, to the weight of the piece.

Two horſes to a tumbrel, and four horſes to a waggon, which will draw nearly twenty hundred weight, on account of the draught being more advantageous, as before obſerved.

Order of march of the park of the artillery.

The park generally marches in the center column of the army in the following order:

1ſt. A guard of the army.

2d. The companies of ſapers and miners, with their tumbrels of tools, drawn by two horſes each.

3d. The artillery front guard.

4th. Three pounders and their ammunition tumbrels in their rear, and 15 or 20 rounds of ammunition in their ſide-boxes, to be ready to fire on any ſudden emergency; ſome of them ſhould be loaded, and the gunners have their matches lighted during the march.

5th. The 6 pounders and their ammunition tumbrels.

6th. The 12 pounders and their ammunition waggons.

7th. The 24 pounders and their ammunition waggons.

8th. The 8 inch howitzers, and the waggons with their ammunition.

9th. The 5½ inch howitzers, and their ammunition.

10th. The mortars with their ſtores in waggons.

11th. The rear covered by ſome light pieces, ſuch as 6 pounders, with their ammunition in front of them; theſe rear pieces ought alſo to be loaded, and have ammunition in their ſide boxes, and the gunners to have their matches lighted, ready to fire on any ſudden occaſion.

12th. The ſpare carriages for the guns.

13th. A waggon with a gin and tackles, *&c.*

14th. Two travelling forges.

15th. The waggons with muſket cartridges.

16th. The waggons with laboratory implements.
17th. The waggons with powder.
18th. The waggons with muſket balls.
19th. The waggons with ſmall ſtores.
20th. The waggons with intrenching tools.
21ſt. The waggons with the artificers materials.
22d. The waggons with the baggage of the park.
23d. The carriages with the batteauxs, &c.
24th. The artillery rear guard.
25th. The rear guard from the army.

It muſt be obſerved, that the artillery men march with the pieces allotted to each company, as directed in chapter 7.

The park flag might be hoiſted on the center gun.

The French march their artillery in a ſimilar manner, but divided into brigades, each of which is commanded by its proper officer, has a detachment of pioneers to aſſiſt in bad rodes, and a guard of gunners and matroſſes.

The firſt brigade always conſiſts of ſome light pieces, followed by their proper ammunition, and preceded by a waggon loaded with tools, in order to make and clear the roads, if there is any occaſion; a gin follows each diviſion, loaded on a ſpare carriage.

The next brigade follows in the ſame manner, preceded by a carriage, loaded with tools, and a detachment of pioneers.

The middle brigade conſiſts of the heavy pieces, and is called the park brigade; and as the others are only followed by ſo much ammunition as is ſufficient upon a ſudden occaſion, the reſt follow the park brigade.

After this comes the baggage, and then the pontoons, with this reſerve; but, if the army is to croſs a river, then as many pontoons march at the head as are ſufficient to make a bridge.

CHAP. XX.

THE MANNER OF FORMING THE PARK OF ARTILLERY, AND ORDER OF ENCAMPMENT.

In forming the artillery park, the poſition varies much in different ſervices; the Britiſh generally place their park about three hundred paces before the middle of the front line of the army, upon ſome riſing ground, except a more convenient ſpot of ground happens to be before ſome wing. But let the ſituation be where it will, the manner of forming the park is the ſame, except ſome artillery officers differ in the diſpoſition of the carriages.

The American park was generally poſted in the center of the ſecond line of the army; but whether in front or rear, it ſhould be poſted on commanding ground.

Mr. Muller obſerves, that the approved method is to divide the artillery into brigades, and to place the guns of the firſt to the right of the front line, and their ammunition behind them in one or more lines. Then thoſe of the ſecond brigade next to the firſt in front, leaving five paces between them, as before, and continue placing all the reſt in the ſame order, the pontoons forming the laſt line: (in America, batteaux are ſubſtituted in lieu of pontoons.)

General Bedford's diſpoſition in forming the park of artillery.

The firſt line conſiſted of thirty two guns, mounted upon their carriages, ſeven ſpare carriages, twenty ammunition carts and two howitzers; the guns pointing forwards.

Second line of fifty waggons. Third of fifty-two waggons. Fourth, of fifty waggons. Fifth of fourteen waggons, thirty pontoons, and three ſpare carriages.

Each carriage takes up two paces or yards, and they are placed at the ſame diſtance, in the ſame line.

The ſecond line is thirty paces behind the firſt; the two next twenty from each other, and the laſt thirty.

The artillery companies and minors, are half encamped to the right, and the other half to the left of the park, in the uſual manner, with ſome of the lieutenants in the rear of them.

In the rear of, and twelve paces from the park, are encamped the civil liſt, all in one line. Behind theſe, and at thirty paces diſtance, is a line of the remaining lieutenants; and behind theſe, the captains and commiſſaries.

Oppoſite to the middle, and thirty paces behind the captains line, is the majors tent; and behind this, at twenty paces, the colonels to the right, and the comptrollers to the left.

Oppoſite to the middle, and fifty paces before the park, is placed the army guard: and oppoſite to the right wing, the artillery guard at the ſame diſtance.

The French method of forming the park is, The carts loaded with tools, which march at the head, are placed to the right of the firſt line; next to that the guns of the firſt brigade, which commonly conſiſt of four or ſix ſmall pieces, with a ſpare carriage to the left of them; the ammunition carriages of this brigade are placed behind, in one or more lines, thirty paces diſtance from line to line.

After this, the ſecond and ſucceeding brigades are placed in the ſame manner, leaving five paces interval between the brigades. They continue to place all guns, with their ſpare carriages, in the front line. The laſt line is made by the pontoons, and other carriages.

In the middle of the front, two light pieces are advanced at a diſtance of twenty paces, loaded with powder, for alarm guns, ready to be fired when required.

To the right of the park are placed the artificers, with their tools, materials and baggage, in a line from the front to the rear.

To the left of the park, the commiſſaries and their baggage. To the right of the artificers is encamped the firſt battalion of artillery, with their baggage, and officers behind them, in the uſual manner; and to the left of the commiſſaries, the ſecond battalion in the ſame manner as the firſt.

The horſes of the equipage are placed behind the firſt battalion, except thoſe of the picket in the rear of the park.

The method that the American park *was generally formed in the late war with Great Britain.*

In the following order, The guns, howitzers, and mortars in the firſt line, placed thus: two 24 pounders on the right, two twelve pounders on the left, the ſix pounders next on the right, the three pounders next on the left flank; the mortars in the center, and the howitzers divided equally on the right and left of them; and the reſt of the heavy pieces divided next to them, and the flag of the park hoiſted in center of the firſt line; the limbers form a ſecond line, three paces behind their reſpective pieces; and the ammunition waggons and tumbrels form a third line, ten paces in the rear of their reſpective pieces.

The ſpare ammunition of the artillery and army, form the next line, at fifteen paces in the rear of each line. The next, the artificers' waggons, with their tools, *&c.* The next line, at fifteen paces, is the baggage waggons of the artillery, artificers, *&c.*

The artillery guard was poſted fifty or ſixty paces in front of the center of the park. The regiments of artillery encamped about fifty paces in rear of the park, with their front to the park; they were on all occaſions encamped by regiments, as they are formed in order for battle; according to ſeniority of rank: the front of the camp occupied the ſame extent of ground as the troops when formed; and the intervals between the regiments were twenty paces.

The tents of the non-commiſſiontd officers and matroſſes were pitched in two ranks, with an interval of ſix paces between the ranks, and two feet between each tent. The tents of the non-commiſſioned officers to be in the front rank, on the right of their companies, in the right wing, and on the left in the left wing of the regiment.

Nine feet front are to be allowed for each tent, with its interval, and twenty in the center of the regiment, for the adjutant.

The captains and ſubalterns tents are to be in one line, twenty feet from the rear of the men's tents;

the captains in the right wing, oppoſite the right of their reſpective companies, and the ſubalterns oppoſite the left, and contrary in the left wing.

The field officers are to be in one line, thirty feet from the line of officers. The colonel oppoſite the center, the lieutenant col. on the right, and the majors on the left.

The ſurgeon, pay maſter and quarter maſter in one line, with the front of their tents in a line with the rear of the field officers' tent. The ſurgeon's on the right, pay maſter on the left, and the quarter maſter in the center.

The kitchens are to be dug behind their reſpective companies, forty feet from the field officer's tents. The ſutlers' tents are to be between the kitchens.

The commiſſaries of military ſtores encamp on the left of the officers, in a line; the artificers encamp on the left of the artillery; the horſes belonging to the park are to be placed in a line twenty feet behind the kitchens.

But if the officers and men belonging to the regiments of artillery were to encamp on the right and left of the park, and their tents facing the park, leaving an interval of twenty paces between the park and front of the men's tents; by which mode the men will be nearer their guns on a ſudden emergency, and the brigade may be formed in a ſimilar manner.

The civil liſt to encamp in the rear of the park, leaving intervals of twenty paces between the front line of tents and the rear line of waggons as a parade; the commiſſaries and conductors of military ſtores on the right of the artificers, and the waggoners on the left, leaving an interval of eight paces between each corps, and their reſpective officers to encamp behind their men, as the other troops.

The kitchens behind their reſpective corps as uſual, and the horſes in the rear of the kitchens; the iſſuing commiſſary of proviſions on the right, and the forage-maſter on the left, in rear of the horſes.

The park to be formed in this manner would be much handier, as each corps would be more diſtinct in their encamping, and the artificers work in the rear of their encampment; the laboratory tent might be pitched on the right of the tents of the commiſſaries of military ſtores.

I have in this chapter given the manner of the Britiſh, French and Americans forming the park; the laſt method ſuggeſted I think is moſt convenient on many accounts, as muſt be obvious.

What has been here obſerved, will give the young artilleriſt a tolerable idea of the nature of the march, and forming the park of artillery.

CHAP. XXI.

SOME GENERAL OBSERVATIONS ON THE VARIOUS PARTS OF DUTY OF THE OFFICERS AND SOLDIERS.

The great variety which is to be attended to in this treatiſe, and the confined limits of a pocket volume will not admit of a minute inveſtigation; I ſhall therefore only treat on general principles in this chapter.

The duty of a *commandant* of a corps is very extenſive, and requires his ſerious attention, as the ſtate has entruſted him with the command of a corps; therefore, he ſhould ſtrictly apply his mind to every thing which may be for the benefit of the ſervice he is in, and the happineſs of the corps which he commands.

The firſt object is diſcipline and ſubordination, which are inſeparable from each other; and by ſtrictly attending to theſe objects, with a firmneſs and evenneſs of temper, he will find himſelf both beloved and feared.

The ſoldier who offers his life as a ſacrifice for the ſafety of his country, deſerves the greateſt attention in making his life as comfortable as poſſible; this depends greatly on the capacity of the commandant in regulating the police of his corps: as the preſervation of the health of the ſoldiers greatly depends on their cleanlineſs and exerciſe, as well as in the manner of cooking their diet; he ſhould have a watchful eye over every grade of officers, and cauſe every one to pay ſtrict attention to their men in thoſe reſpects.

The commandant ſhould, as often as once a month, make a general inſpection of his regiment, to examine minutely, every thing belonging to the corps, obliging the commanding officers of companies to account for all deficiencies.

The field-officers and the oldeſt captain ſhould be aſſembled once a month to hold a council of adminiſtration, to examine all the companies, and the other books belonging to the corps, to ſee that all receipts and deliveries are entered in proper order, and the police of the regiment be properly adminiſtered.

The commanding officer ſhould be very particular in examining the returns before he ſigns them, as the veracity of his character is at ſtake, if they ſhould prove defective.

When the corps are under arms, or on a march, the commandant ought to remember that he is anſwerable for the good order and diſcipline of it, and therefore ſhould oblige every officer to perform ſtrictly his duty.

And, as Mr. Sims obſerves, what might we not expect from a commandant, who is in himſelf a man of zeal for the ſervice, and a man of vigilance, worth and fortitude; he is uncontroulable in his command of the regiment, eſpecially where he makes a good uſe of it. The officers, (at leaſt thoſe worthy of that name) will regard him as their brother, and the ſoldiers look on him as their father; he will be obeyed with pleaſure and reſignation by both, and the buſineſs of the regiment will be done with eaſe and regularity.

The duty of a *major* of a corps. He is particularly charged with the diſcipline, arms, accoutrements, cloathing, and generally with the whole interior management and economy of the regiment.

This office requires a man of activity, and one who will command and attract reſpect; well acquainted with the ſtrength of the battalion, and detail of the army; attentive that his corps is not detached on duty out of order, and who has a perfect knowledge of the exerciſe, and all manœuvres.

The multiplicity of details he is charged with, require the utmoſt attention to keep them clear and free from confuſion. The regimental book he ſhould have kept regular, in which muſt be entered the names of the officers, dates of their commiſſions, &c. A deſcriptive liſt of the non-commiſſioned officers and matroſſes, and every caſualty that happens in the corps.

If the major would implant the reſpect due to him in the breaſt of his officers, he cannot ſucceed better, to eſtabliſh ſubordination, than by ſhewing a proper deference to his ſuperior officers.

The duty of the field ſtaff of a corps, which conſiſts of an *adjutant, quarter maſter, pay maſter, ſurgeon and ſurgeon's mate.* The three firſt are generally choſen out of the ſubaltern officers; they ought to be active, vigilant men, who are ambitious of acquiring an acquaintance with their reſpective duties; and do no other duty than what belongs to their different ſtaff appointments. The *adjutant* muſt keep an exact detail of the duty of the officers and non-commiſſioned officers of his regiment, taking care to regulate his roſter in ſuch a manner as not to have many officers or non-commiſſioned officers, of the ſame company, on duty at the ſame time.

He muſt attend on all parades of the regiment, detachments or guards; he muſt count them off and divide them into diviſions, platoons or ſections; and inſpect their dreſs, arms, accoutrements and ammunition, and conduct them agreeable to orders.

In fact, he muſt be ready to receive and execute any orders that may come from his commanding officers, and never be abſent from his duty, without leaving an officer to do it in his abſence; he muſt keep books for the entry of all orders, and every other thing relative to his duty, and the regularity of the corps.

The *quarter maſter* ought to write a good hand, be a good accomptant, and well ſkilled in the details of a regiment; he ſhould be well acquainted with the manner of their encamping, that there may be neither more nor leſs ground occupied than is neceſſary for his regiment. Through him the regiment receives the billets for their quarter, when cantoned, camp equipage, arms, accoutrements, ammunition, proviſions and forage; diſtributing them to the regiment, taking the neceſſary vouchers for the delivery and entering all receipts and deliveries in a book kept by him for that purpoſe. Finally, he ought to apply his mind, and gain a perfect acquaintance with every individual circumſtance of his duty.

The *pay maſter* ought to be an honeſt and careful man, well acquainted with the uſe of the pen, and a good accomptant, as he is generally intruſted with the pay and cloathing, and their diſtribution to the individuals of the regiment. Therefore, there is a propriety that he ſhould be elected by ballot, by thoſe who intruſt him with their property: all the commiſſioned officers ſhould vote, and the non-commiſſioned officers and privates of each company ſhould have one vote, to be delivered by the hand of a non-commiſſioned officer of the reſpective companies. The major, in the preſence of the officers, ſhall examine and count the votes, and declare the choice; the perſon choſen the commandant will recommend for a commiſſion, as pay maſter to the regiment; the corps to be reſponſible for his fidelity in ſaid office.

He is to keep an accurate copy of pay rolls, and regular accompts of money and cloathing, and duplicate receipts, regularly digeſted, in books for that purpoſe, ſo as to account for his conduct whenever it is neceſſary.

The duty of a *ſurgeon* and *ſurgeon's mate*, are of the greateſt importance to the lives and happineſs of the individuals of the regiment; the ſurgeon ought to be perfectly acquainted with the ſtructure of the human body, and have a knowledge of all the diſorders incident thereto, and the proper methods of cure; to have a perfect knowledge in all the extenſive parts of ſurgery; a man of good judgment, temperate in his living, affable in his manners, and attentive to his duty. The mate ſhould have an acquaintance with the different parts of his duty:—ſtudy and application is the only way to obtain the requiſites of the ſurgeon, and appear reſpectable in his ſituation.

The duties of the *captain* and *ſubaltern officers* of a company are relative. They are, in their reſpective ſituations, to pay the greateſt attention to the health of their men; their diſcipline, arms, accoutrements, ammunition, cloaths, and neceſſaries.

Their firſt object ſhould be to gain the love of their men, by treating them with kindneſs and humanity; enquiring into the cauſes of their complaints, and when well founded, ſeeing them redreſſed; but, on no account, be two familiar with the ſoldiers, or ſuffer them to take liberties with them; always preſerving an evenneſs of temper, and a ſteady hand in diſcipline of the company. The officers ſhould know every man of their company by name and character, and viſit thoſe who are ſick, ſpeaking with ſympathy to them; to attend that their proviſions, either medicine or diet, are duly adminiſtered, and to make their ſituation as comfortable as circumſtances will admit. The reſpect which officers gain from their men, by this attention, is great, and the pleaſing ſatisfaction, that by their means the lives of many valuable men were preſerved to render their country further ſervice.

The captain ſhould pay particular attention to the order and diſcipline of his company, as he is accountable for the neglect thereof to the commandant of the corps.

He muſt inſpect his company weekly, cauſing all deficiencies to be immediately ſupplied; and puniſhing all irregularities.

The men ſhould be often exerciſed in ſquads, under the direction of a non-commiſſioned officer, who is to be anſwerable for the dreſs and behaviour of the men belonging to his ſquad.

The officer ſhould be very attentive to all the duties of the company, and with a watchful eye compel the non-commiſſioned officers to do their duty with exactneſs and activity; taking care never to reprimand them for a fault in preſence of the ſoldiers, as it will deſtroy that confidence which the men ought to place in them.

There ſhould be a book kept in the company by the commanding officer, in which muſt be entered a deſcriptive liſt of every non-commiſſioned officer and ſoldier of his company, and every occurrence of the company in regular order, which form ſhould correſpond with the regimental book.

No man ſhould be ſuffered to remain in the company, who has an infectious diſorder, but be immediately ſent to the hoſpital, or other place provided for the reception of ſuch patients, to prevent the ſpreading of the infection.

In the abſence of any ſoldier their arms and accoutrements, are to be properly taken care of, agreeably to the regulations preſcribed.

Though no officer ſhould be ignorant of the ſervice of the guards, yet it is particularly requiſite that the ſubaltern officers be perfectly acquainted with that duty; they being, oftener than any other officers, entruſted with the command of a guard, on the faithful execution of which depends the ſafety of an army.

The artillery officers muſt not imagine that they have arrived at the zenith of a knowledge of their duty, when they have made themſelves acquainted with the ordinary duties of camp: No, they are only entering into the firſt rudiments of their ſcience; they are to attain a knowledge of the practice and theory of the artillery, in all its various parts. Attention to this part of duty is both proper and commendable. In making a proficiency, the mind will be cultivated and the underſtanding improved. Though at firſt it may require cloſe application to ſtudy, yet a cheerful compliance and a little perſeverance, will ſoon conquer what appeared ſo difficult, and it will become an agreeable theme of amuſement, which will add to his reputation, and eſtabliſh his character in his profeſſion, as an artilleriſt.

The *non commiſſioned officers* cannot be too circumſpect in their behaviour towards the men, by treating them with mildneſs, and at the ſame time obliging every one to do his duty. By avoiding too great familiarity with the men, they will not only gain their love and confidence, but be treated with reſpect; by a ſtrict attention to cleanlineſs, and an active vigilance in their duty, they will acquire a degree of confidence from their officers.

The firſt of which is the *ſerjeant-major*, who is entruſted with the interior details and diſcipline of the regiment, and ought to be acquainted with the manner of keeping a roſter: he muſt always attend the parade, and aſſiſt the adjutant in the various parts of his duty: he muſt pay the greateſt attention to the conduct of the non-commiſſioned officers, and ſoldiers; never conniving at the leaſt irregularity committed by them, but muſt exact from both of them implicit obedience.

The *quarter-maſter ſerjeant* is an aſſiſtant to the quarter-maſter, and in his abſence does the duty (except otherwiſe ordered). He ſhould make himſelf acquainted with that duty, and on a march ſee to the loading of the tents, and march with the baggage in order to prevent loſs, or any irregularity of waggoners in the march.

The duty of *firſt ſerjeant* of a company, is ſimilar to that of an adjutant of a regiment; from the importance of his office, the diſcipline of the company, the conduct of the men, their exactneſs in obeying orders, and the regularity of their manners, will in a great meaſure depend on his vigilance.

He ſhould be intimately acquainted with the names and character of the ſoldiers of the company: he will keep the details of the company, and warn the men regularly in their turn for duty: he muſt take the daily orders in a book kept for that purpoſe, and ſhew them to his officers.

He is to make out all the returns of the company, and copies of them to be entered in the company books: he is not to go on any duty detached from the company, nor lead a platoon or ſection, but always to be a file-cloſer.

Each *ſerjeant* and *corporal* will be in a particular manner anſwerable for the ſquad committed to his care. He muſt pay ſtrict attention to their conduct in every reſpect: that they keep themſelves and their arms always clean; that they have their effects always ready, and put where they can get them immediately, even in the dark, without confuſion.

When teaching the recruits their exerciſe, they muſt uſe patience, and treat them with mildneſs: they muſt ſuppreſs all quarrels and diſputes in the company, and if neceſſary, uſe their authority by confining the offender.

A *corporal*, when on guard, muſt teach the ſentries to challenge briſkly, and to be active in every thing they have to do in their different ſituations; and when he relieves them he muſt make them deliver the orders diſtinctly. When a guard is relieved, the non-commiſſioned officers take the orders from thoſe they relieve; when ſent to viſit the ſentries, they ſhould inſtruct them in their duty.

By the application of the non-commiſſioned officers to their duty, and their attention to ſupport order and diſcipline in the company, by ſetting a proper example themſelves, they will induce their officers to place confidence in them, thereby adding to their reputation, and rewarding their merit.

The *ſoldier*, when he enters the military liſt, in the cauſe of his country, by a voluntary engagement, feels that importance which introduces an intrepid courage, if conducted by reaſon, which is the moſt faithful companion of a ſoldier, among the dangers to which the profeſſion of arms expoſes him.

In attaining this, the recruit having received his neceſſaries, ſhould in the firſt place learn to dreſs himſelf with a ſoldier-like air; how to ſalute his officers when he meets them; to clean his arms, waſh his linen and cook his proviſions.

He ſhould early accuſtom himſelf to dreſs in the night; and to place his effects properly in his knapſac, ſo as to carry them with eaſe and convenience: and have it placed where he can put his hand on it, that on an alarm, he may repair with the greateſt alertneſs to the parade.

When learning to march, he muſt take the greateſt pains to acquire a firm ſtep, and a proper balance of his body. He muſt accuſtom himſelf to the greateſt ſteadineſs under arms, to pay attention to the commands of his officers: he muſt exert himſelf to acquire a perfect knowledge of his duty, and to perform the various parts with vivacity.

Whenever he is ordered under arms, he muſt appear well dreſſed, with his arms and accoutrements clean and in good order; and every thing agreeable to the orders he may receive.

When he mounts guard and goes on ſentry, he muſt receive his orders from the ſentry he relieves; and have them, if neceſſary, well explained by the corporal that goes round with the relief.

He muſt never go more than twenty paces from his poſt, and if in a retired place, or in the night, ſuffer no one to approach within ten paces of him; and if neceſſary, to call for the ſerjeant of the guard, who will attend with an eſcort from the guard, to enquire the cauſe.

A ſentinel muſt never reſt upon his arms, but keep walking on his poſt: he muſt never ſuffer himſelf to be relieved but by his corporal: challenge briſkly in the night, and ſtop thoſe who have not the countersign, or having been ſtopped, ſhould attempt to eſcape, he may fire on them.

The ſoldier is implicitly to obey the orders of his ſuperior officers, aſking no reaſons for them, nor dare to think them of little importance; as no officer, it is preſumed, will command a ſoldier out of the line of his duty.

He muſt never abſent himſelf from roll-call, or, on a march, from his platoon, nor from any part of his duty, without having leave of his commanding officer; by which means his duty will become eaſy and natural, and he will have the confidence of his officers, which will make a military life happy and agreeable.

As a knowledge of the duties of mounting guards is of the greateſt importance, both to the officers and ſoldiers, on whoſe vigilance the ſafety of the camp depends, it will be neceſſary, in this place, to give ſome general principles on this part of duty.

The artillery is not, in general, included in the details of the army for guard duty, but only furniſhes their own guards for the ſecurity of the park and their encampment, which will be compriſed in the park and quarter guards, and theſe details will conſiſt of

Subalt.	*Serjt.*	*Corpl.*	*Drumm.*	*Matroſſes*	
1	1	1	1	27	For the park guard.
		1		9	For the quarter guards.

The park guard may be augmented to a captain's guard, if the commanding officer of the artillery thinks it abſolutely neceſſary; but, in ordinary caſes, a ſubalterns guard is ſufficient. When the park guard is mounted by a ſubaltern, the captain does the duty as officer of the day, for the artillery; but, when a captain mounts the guard, a field officer of the artillery acts as officer of the day.

After the duties of the grand parade are performed, the brigade major, (or adjutant of the day) then commands,

Preſent—arms!

And advancing to the officer of the day, acquaints him that the guards are formed; and on receiving his orders to march them off, he commands,

Shoulder—fire-lock!

By platoons! to the right—wheel! march!

The whole wheel and march by the officer of the day, the officers ſaluting him as they paſs; and when the whole have paſſed, they wheel off and march to their reſpective poſts in the greateſt order. When the new guard approaches the poſt, they carry their arms; and the officer of the old guard, having his guard paraded, on the approach of the new guard, commands,

Preſent—arms!

In the mean time, the new guard marches paſt the old guard, and takes poſt three or four paces on its right, both guards fronting towards the enemy; and the officer of the new guard commands,

Preſent—arms!

Then the two officers approach each other, and the relieving officer takes his orders from the relieved. Both officers then return to their guards, and command,

Shoulder—fire-lock!

Non-commiſſioned officers! forward march!

The non-commiſſioned officers of both guards who are to relieve the ſentinels, advance in front of the new guard.

The ſerjeant of the new guard then tells off as many ſentinels as are neceſſary, and the corporal of the new guard, conducted by a corporal of the old guard, relieves the ſentinels, beginning by the guard-houſe.

When the ſentinel ſees the relief approach, he preſents his arms, and the corporal, halting his relief at ſix paces diſtance, commands,

Preſent—arms!

Recover—arms!

This laſt command is only for the ſentinel relieving, and the one to be relieved; the former immediately approaching with the corporal, and having received his orders from the old ſentry, takes his place; the ſentry relieved marches into the ranks, placing himſelf on the left of the rear rank.

Front—face!

Both ſentries face to the front. The corporal then orders,

Shoulder—fire-locks! Support—arms!

March!

And the relief proceeds in the ſame manner till the whole are relieved.

When the corporal returns with the old ſentinels, he leads them before the old guard, and diſmiſſes them to their ranks.

The officer of the old guard then forms his guard in the ſame manner as when mounted, and marches them in order to the parade, and forms the men of the different regiments together, and ſends them under the care of a non-commiſſioned officer, or careful ſoldier, to their reſpective corps.

When the old guard marches off, the new guard preſent their arms, till they are gone, then ſhoulder, face to the left, and take the place of the old guard.

The officer then orders a non-commiſſioned officer to take down the names of the guard, in the following manner ;

Hours they go on,		10—4, 10—4.	12—6, 12—6.	2--8, 2--8.
Poſt N°.	1	*men's names.*	*men's names.*	*men's names.*
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			

Suppoſe the guard to conſiſt of twenty ſeven men and to furniſh nine centinels, they are divided into three relieves, and the poſts being numbered, begining always with the guard houſe, each man's name is put down againſt the number of the poſt at which he will always ſtand ſentry during the guard, by which means an officer always knows what particular man was at any poſt, during any hour of the day or night.

The relief of ſentries is always to be marched in the greateſt order, and with ſupported arms ; the corporals often looking back to obſerve the conduct of the men And if an officer approaches, he is to order his men to handle their arms, ſupporting them again when he has paſſed.

The corporals are to be anſwerable that the ſentries, when relieving, perform their motions with the greateſt ſpirit and exactneſs.

A corporal who is detected in having the inſolence to ſuffer ſentries to relieve each other without his being preſent, ſhall, as well as the ſentinel ſo relieved, be ſeverely puniſhed.

The officer of the guard muſt, immediately after the relieving the old guard, viſit the ſentinel, and examine the ground round his poſt, and if he thinks the ſentries not ſufficient to ſecure him from ſurprize, he is at liberty to place more, but not to alter any that are already poſted with permiſſion of the officer of the day, who viſits his poſt, and informs him of the new ſentries ſet.

He muſt, on no account ſuffer the ſoldiers to pull off their accoutrements, or ſtraggle more than twenty paces from the guard.

At every relief the guard muſt parade, and the roll be called; and, during the night, not be permitted to ſleep on any account, but have his arms ready to fall in on the leaſt alarm. Between the reliefs, the ſentries muſt be viſited by a non-commiſſioned officer and a file of men, more eſpecially in the night, to keep the ſentries alert.

The ſentinels, after receiving the counterſign, will challenge briſkly, on the approach of any perſon, and never ſuffer more than one to advance, till he has given the counterſign. If the perſon challenged has not the counterſign, the ſentry muſt call the ſerjeant of the guard, and keep the perſon at a little diſtance from his poſt, till the ſerjeant comes to examine him.

If a ſentry, on challenging, is anſwered, *relief patrol* or *rounds*, he muſt in that caſe order the ſerjeant or corporal to advance with the counterſign; and if he is then aſſured of their being the relief, &c. he may ſuffer them to advance.

A ſentinel muſt take care not to be ſurpriſed ; he muſt never ſuffer the perſon who advances to give the counterſign ; to advance within reach of his arms, and always charge his bayonet.

The officers of the day will viſit the ſeveral guards during the day, as often, and at ſuch hours as they judge proper. When the ſentry before the guard perceives the officer of the day, he will call to the guard to turn out ; and the guard, being paraded, on the approach of the officer of the day, preſent their arms.

The officer of the day will examine the guard, ſee that none are abſent ; that their arms and accoutrements are in order ; that the officers and non-commiſſioned officers are acquainted with their duty, and that the centinels are properly poſted and have received proper orders.

During the night, the officer of the day will go the grand rounds. When the officer of the day arrives at the guard, from whence he intends to begin his rounds, he will make himſelf known as ſuch, by giving the officer of the guard the parole. He will then order the guard under arms, and having examined it, demand an eſcort of a ſerjeant and two men, and proceed to the next poſt.

When the rounds are challenged by a ſentinel, they will anſwer, *Grand rounds !* and the ſentry will reply, *ſtand, grand rounds! advance, ſerjeant, with the counterſign !* upon which the ſerjeant advances and gives the counterſign. The ſentinel will cry, *Advance, rounds!* and preſent his arms till they have paſſed.

When the ſentry before the guard challenge, and is anſwered, *Grand rounds!* he will reply, *Stand, grand rounds! turn out the guard, grand rounds!* upon the ſentinel's calling, the guard is turned out, and drawn up in good order, with ſhouldered arms, the officers taking their poſts. The officer commanding the guard will then order a ſerjeant and two men to advance towards the rounds, and challenge. When the ſerjeant of the guard comes within ten paces of the rounds, he is to halt and challenge briſkly. The ſerjeant of the rounds is to anſwer, *Grand rounds!* The ſerjeant of the guard replies, *Stand, grand rounds! advance, ſerjeant, with the counterſign!* and orders his men to preſent their arms. The ſerjeant of the rounds advances alone, and giving the counterſign, returns to his rounds, and the ſerjeant of the guard calls to his officer, *The counterſign is right!* on which the officer of the guard calls, Advance, rounds! the officer of the rounds then advances alone, and on his approach, the guard preſent their arms. The officer of the rounds paſſes along the front of the guard immediately to the officer (who keeps his poſt on the right), and gives him the parole. He then examines the guard, orders back his eſcort, and demanding a new one, proceeds in this manner to the other guards.

It may not be improper to mention here the honors due from guards to general officers and others.

To the commander in chief: All guards turn out with preſented arms. The drums beat a march and the officers ſalute.

To major generals: They turn out with preſented arms, and beat two ruffles.

To brigadier generals: They turn out with preſented arms, and beat one ruffle.

To officers of the day: They turn out with preſented arms, and beat according to their rank.

Except from theſe rules a general officers guard, which turns out and pays honors only to officers of ſuperior rank to the general whoſe guard it is.

To colonels: Their own quarter guard turn out once a day, with ſhouldered arms; after which they turn out and ſtand by their arms.

To lieutenant colonels: Their own quarter guards turn out once a day with ſhouldered arms, after which they only turn out and ſtand by their arms.

To majors: Their own quarter guards turn out once a day, with ordered arms; at all other times they ſtand by their arms.

When a lieutenant colonel or major commands a regiment, the quarter guard is to pay him the ſame honors as are ordered to a colonel.

All ſentries preſent their arms to general officers, and to field officers of their regiment; to all other commiſſioned officers they ſtand with ſhouldered arms.

The preſident of congreſs, all governors in their own ſtates, and committees of congreſs at the army, ſhall have the ſame honors paid them as the commander in chief.

When a detachment with arms paſſes before a guard, the guard ſhall be under arms, and the drums of both beat a march.

When a detachment without arms paſſes, the guard ſhall turn out and ſtand by their arms. After dark no honors are to be paid by the drum.

After conducting the young artilleriſt through ſeveral parts of his duty, it may be proper to paſs a *review of parade.*

When the artillery is to be reviewed with the infantry, they will take poſt on their right, unlimber their pieces, and dreſs with the line, the limbers and tumbrels dreſs in the rear of their reſpective pieces.

When a battalion is to be reviewed, it muſt be drawn up in the following manner: The ranks at four paces diſtance from each other; the colors advanced four paces from the center; the colonel twelve paces before the colors; the lieutenant colonel four paces behind the colonel; the major on the right of the battalion, in the line of officers; the adjutant behind the center; the officers commanding platoons eight paces before their intervals; the artillery officers divide themſelves equally in front of their pieces, and advance the ſame diſtance, and dreſs with the infantry officers; and the other officers on the ſame line, equally divided in front of their reſpective platoons; the ſerjeants who cover the officers, take their places in the front rank of their platoons; the other noncommiſſioned officers, who were in the rear, remain there, falling back four paces behind the rear rank, and the drummers and fifers are equally divided on the wings of the battalion, dreſſing with the front rank; the ſerjeants of the artillery will be equally divided in the rear of their pieces, and the noncommiſſioned at their different ſtations at the guns;

the two pieces on the right to be loaded with powder, and matches lighted, and as ſoon as the general who is to review arrives on the right of the parade, the right piece will be diſcharged, and then the ſecond, obſerving a ſhort ſpace of time between each piece.

When the general officer, who is to review them, is within thirty paces of the battalion, the colonel orders,

Battalion! Preſent—Arms!

On which the men preſent their arms, and the artillery drums on the right—the drums on the right wing of the battalion ſalute him according to his rank: the officers and colors ſalute him as he paſſes, in front of the troops; and on his arriving at the left, the drums beat the ſame as on the right. The col. then commands,

Shoulder—Fire-lock!

And when the general has advanced to the front,

Rear rank! cloſe to the front!

On which the officers of the artillery and infantry face to their platoons.

March!

The rear rank cloſes to the front, the officers ſtepping off at the ſame time; thoſe commanding platoons, take their poſts in the front rank, and the others go through the intervals to their poſts in the rear. The artillery officers will, at the ſame time, face, and march to their poſt in the line.

The officer commanding the artillery will then command,

Single pieces! To the right—Wheel! *March!*

The limbers will fall in the rear of their reſpective pieces and follow them; the ammunition tumbrels will march in the rear of the pieces; and march by the general.

The col. of infantry then commands,

Battalion! By platoons—To the right! Wheel! March!

The whole wheel by platoons to the right, and march by the general: the col. at the head of the battalion, with the major behind him, followed by the drums of the right wing; the adjutant on the left of the fifth platoon; and the lieut. col. in the rear, preceded by the drums of the left wing.

The artillery and infantry officers and colors ſalute when within eight paces of the general; and the col. or commander of the troops, advances to him.

The troops having marched to their ground and formed, the general orders ſuch exerciſe and manœuvres as he thinks proper.

The next part of duty to be attended to is, that of *reviews of inſpection.*

For a review of inſpection, the battalion muſt not be told off into platoons, but remain in companies, at open order; the drums and fifers on the right, and the enſigns, with the colors, in front of their reſpective companies.

The inſpector begins with a general review, paſſing along the front of the battalion from right to left, accompanied by the field and ſtaff officers. The general review over, the col. commands,

Rear rank! Cloſe to the front!
March!

The rear rank cloſes to the front, the officers remaining in front.

By companies! To the right—Wheel!
March!

Each company wheels to the right; the captains then open their ranks and order

Non-commiſſioned officers! To the front!
March!

The officers take poſt four paces, and the non-commiſſioned two paces in front of their company.

The whole then order their fire-locks by word of command from their captains, except the firſt company, where the inſpection begins; when the firſt company has been inſpected, they order their fire-locks, and the next company ſhoulders; the others proceed in the ſame manner, till the whole are inſpected.

The field and ſtaff-officers accompany the inſpector while he inſpects the companies; and when the inſpection is over, the colonel forms the battalion, and cauſes it to perform any exerciſe or manœuvres the inſpector thinks proper to order.

Note, The inſpection of the corps of artillery is as the above, excepting when they are to be inſpected with the ordnance and ſtores detached to each company, then they man out the pieces of artillery, and the officers and non-commiſſioned officers take their ſeveral poſts. If the inſpector requires the companies to wheel for inſpection, the commanding officer of the artillery commands,

By companies! to the right—wheel! March!

Each company will wheel to the right, the limbers and tumbrels wheels into the rear of their reſpective pieces, and dreſs with each other; the captains will then order,

Serjeants and corporals! to the front—March!

The officers take poſt four paces, and the ſerjeants and corporals two paces in front of the line of guns, the bombardiers and gunners muſt keep their poſts at the guns, as they are not immediately accountable for the police of the company. The officer commanding the company will preſent to the inſpector an inſpection roll, ſpecifying the ſtate of his company; their cloathing, arms and equipments; the nature of their ordnance and ordnance ſtores, in each particular; carriages, horſes, &c. This return muſt correſpond with the inſpection, and account for all alterations in their monthly returns. And if they are only inſpected once a year, in the ſame manner in the yearly returns. Each company having a book wherein is copied all returns, an account of all ordnance and ſtores, and the expenditures of them, and all occurrences of the company.

The inſpector inſpects the companies, the ordnance and ſtores, &c. When the corps of artillery, or any company are inſpected without the pieces of artillery, and their ſtores, they are to conform to the rules for the infantry.

The duties of *Roll Call* are of importance in the regularity of diſcipline, upon which depends the happineſs and ſafety of an army.

The rolls ſhall be called in each battalion, at *troop* and *retreat* beating, at which times the men are to parade with their arms; and at the beating of the *reveille*, and at *noon*, the commanding officers ſhall cauſe the rolls of their reſpective companies to be called, the men parading for that purpoſe without arms, and to be detained no longer than is neceſſary to call the roll.

The non-commiſſioned officers are to viſit their reſpective ſquads, a quarter of an hour after *Tattoo* beating, ſee that they are all preſent and retired to reſt, and make their report to the commanding officer of the company.

No non-commiſſioned officer or ſoldier is to be abſent from roll call, without permiſſion from the commanding officer of the company.

No commiſſioned officer to be abſent from roll-call, without permiſſion from the commanding officer of the regiment.

After the adjutant has paraded the non-commiſſioned officers and ſoldiers, and dreſs'd the ranks, he will then inform the major that the regiment is dreſs'd who will then command,

Gentlemen officers! take poſt—in battalion!

The commiſſioned officers will take their reſpective poſts, and advance eight paces in front, and dreſs.

The major will then inform the colonel, or commanding officer preſent, that the regiment is paraded, who will order the roll to be called.

The major or adjutant will order,

Orderly ſerjeants! to the front—march!

They will march through the intervals on the right of their companies, four paces in front—will then command,

Orderly ſerjeants!

To the right about face—call the rolls!

The commiſſioned officer of each company will face to the right about, and attend that the roll is properly called, and the men anſwer regularly to their names.

The orderly ſerjeants will call off the men's names on the roll of the companies, diſtinctly, and if, on the third time calling any man, he does not anſwer to his name, he muſt be pricked on the roll as abſent; after the roll is called, the orderly ſerjeants are to report the names of the abſent men to the commanding officer of their reſpective companies preſent—after which he will order,

Orderly ſerjeants, to your poſts—march!

The commiſſioned officers will, at the ſame time, face to the right about; and then the commanding officer will direct the adjutant to read all the orders of the day; after which he will direct the parade to be diſmiſſed, on which the major will command,

Gentlemen officers! you are diſmiſs'd!

They will then retire from their poſts.

The adjutant will, after the men are warned for duty, diſmiſs the parade.

The ſurgeon or his mate, muſt attend morning and evening roll-callings, at all times when the regiment is under arms, and be preſent at all puniſhments, to judge if the offender's life is in danger, that no puniſhment may extend to life or limb.

When a young officer joins the regiment the adjutant ſhould give him a copy of all orders relative to exerciſe and other duties, which he muſt correctly inſert in a book kept for that purpoſe.

An officer upon duty, cannot be ordered for any other, before that duty is finiſhed, except he be on the picquet.

If an officer's tour for duty happens when he is on the picquet, he ſhall be immediately relieved, and go upon that duty. The tour of picquet ſhall paſs him, though he ſhall not have been on it a quarter of an hour. If any officer's tour of the picquet, general court martial, or duty of fatigue, happens when he is on duty, he ſhall not make good that picquet, court martial, or fatigue, when he comes off, but his tour ſhall paſs; and the ſame if he be on general court martial or duty of fatigue; or if his tour for guard or detachment ſhould then happen, his guard or detachment ſhall paſs, and he ſhall not be obliged to make them up.

Guards or detachments, which have not marched off from the place of parade or rendezvous, are not to be reckoned as duty done; but, if they ſhould have marched from the place of parade, it ſhall be reckoned as a duty, though they ſhall be immediately diſmiſſed.

General court martials which have aſſembled, and the members ſworn in, ſhall be reckoned a duty, though they ſhould be diſmiſſed without trying any perſon.

In all duties, whether with or without arms, picquets or court martials, the tour of duty ſhall begin with the eldeſt downwards.

Under this head I have endeavoured to give the young artilleriſt an idea of the outlines of the various parts of duty, which he may be called to perform, with as much perſpicuity as the nature of the ſubject would admit.

CHAP. XXII.

THE MANNER OF FIXING FIELD AMMUNITION & THEIR COMPOSITIONS.

It is abſolutely neceſſary that the young artilleriſt ſhould be acquainted with the different compoſitions neceſſary in making up his field ammunition; I would, therefore, recommend the following directions to his peruſal.

ARTICLE I.

Slow Match,

Is made of ſwingling tow, ſpun in a rope of two ſtrands, coiled up in a coil, and boiled up in a kettle with lye made of aſhes and ſalt petre; you may add the lees of wine; if it cannot be conveniently procured, I have found the lees of cyder anſwer very well, after it is well boiled with theſe ingredients, take it out and dry it well, when it will anſwer for immediate uſe.

ART. II.

Quick match.

Quick match for tubes, take ſpirits of wine, four quarts; water, twelve quarts; cotton, ſix pounds; the ſalt petre is to be put into the water cold; and when it is boiled, the cotton is to be put in and ſoaked well; then put in the ſpirits, and begin to dip the cotton in meal powder (keeping the liquor boiling gently), which muſt be rubbed on with an inſtrument made for the purpoſe, and the ſalt-petre ſifted on it.

Otherwiſe thus,

For cotton quick match, cotton, 1 *lb.* 13 *oz.* ſalt petre, 1 *lb.* 8 *oz.* water, 5 pints; iſinglaſs, 4 oz. ſpirits of wine, 2 quarts; meal powder, 10 *lb.*

Otherwiſe thus,

For worſted 10 *oz.* ſpirits of wine, 3 pints; water 3 pints; iſinglaſs, ½ *oz.* meal powder, 10 *lb.*

Sundry directions are to be obſerved.

Firſt. Let the iſinglaſs for quick match be hammered on a ſmith's anvil, till it is quite flat, then break it into ſmall pieces in a copper pan, pour on it three quarts of water, and let it ſoak for one or two days, till it forms the conſiſtency of jelly; when it is ſoaked enough, put it over a ſmall fire, and boil it a quarter of an hour, then take it out for uſe.

If you do not want to uſe it all at once, you may diſſolve it as often as you uſe it.

Take your cotton or worſted, either one, two, three, or only a thread, according to the ſize you want to make, untwiſt it in a copper pan, leaving one end at the handle; let ſalt-petre be under the cotton, put it over the fire and let it boil about an hour.

Then take it into another room, and put in about 6 *lb.* of mealed powder over it, or as much as will cover it well; let it be well ſoaked, and then take the end that is faſtened to the handle, and draw it through your fingers gently into another pan, leaving the end faſtened to the handle, as at firſt. Then put the liquor that was left over it, and let it ſtand a ſmall ſpace of time, as before; then faſten the end to the reel, and reel it off. When this is done, lay your reel on a table, and take a fine hair ſieve, and mealed powder, and ſift it over the ſtrands of quick match, on both ſides, when dry, the quick match is fit for uſe.

Sometimes the cotton or worſted is covered with white wine vinegar, and a quantity of ſalt petre, *&c.* Great care muſt be taken that the quick match goes eaſy in whatever pipe or tube you have occaſion to put it.

If it ſhould happen that neither ſpirits of wine nor vinegar can be had, ſmall or ſpruce beer, or any other liquor that is glutinous, may anſwer as a ſubſtitute.

ART. III.

Tubes,

Are generally made of tin or reeds, with a cap or bowl fixed on one end, and the other end formed ſimilar to a writing pen, in order to perforate the cartridge; the ſtems of the tin tubes have a quick match drawn through their cylinders, and one end coiled in the bowl or cup, and covered with mealed powder, moiſtened with ſpirits of wine.

Thoſe whoſe ſtems are made of reeds are filled with mealed-powder, moiſtened with the ſpirits of wine, properly incorporated after the compoſition in the tube. When it is partly dry, pierce it through with a wire; thoſe tubes whoſe ſtems are made of reeds are not ſo long as the tin tubes; as the air in the pierced tube forces the fire to penetrate the cartridge, with which the piece is loaded, without the aſſiſtance of a priming wire, or the tube entering the cartridge. The bowls or caps of the tubes, after they are filled with the compoſition, as obſerved, are covered with paper, to prevent the air from exhaling the ſpirits of the compoſition, as alſo the pen part to be covered with paper.

The general length of tin tubes are as follow:— For heavy 6 pounders, 8 inch howitzers, and light 24 pounders, ſix inches and five tenths.

For medium 6 pounders, five and an half inch howitzers, light 12 pounders, and heavy 3 pounders, five inches and nine tenths.

For light 6 pounders, and 3 pounders, four inches and ſeven tenths.

The diameters of the ſtems of the tubes depend on the different diameters of the vents of the various pieces of ordnance.*

ART. IV.

Cartridges,

Are made of coarſe ſtrong paper, manufactured for the purpoſe, parchment, bladders, and woolen flannel. Paper cartridges are fixed principally for heavy ordnance, in garriſon duty. Woolen flannel is preferable to either parchment or bladders for fixed ammunition, which is uſed in quick firing in field duty, either with round, grape, or caniſter ſhot.

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* The tube may be made, alſo, of tin, about four inches long, tapering, by which means they will ſuit any caliber of ordnances and found by experience to be more certain in giving fire to the charge of the piece, and may be kept much longer without damage; the tube may be made of paper, where tin or reeds cannot be had; ſince this improvement in making tubes has taken place, thoſe long tubes with quick match drawn through them, is laid aſide; as the others anſwer every purpoſe, with more certainty, and will communicate the fire to the powder in a paper cartridge to a conſiderable diſtance without piercing the cartridge with a priming wire..

The following tables of the dimenſions of formers and cartridges for different kinds of ordnance, will give the young artilleriſt a tolerable idea of this part of duty.

Formers.

Nature.	*Diameter.*		*Circumference.*		*Round & Flat.*
℔	Inches	Dec.	Inches,	Dec.	Inches.
½	1	50	4	7	13
1	1	92	6		16
1½	2	21	6	9	18
3	2	81	8	8	22
4	3	11	9	7	24
6	3	52	11		27
9	4	6	12	7	30
12	4	48	14		33
18	5	10	16		33
24	5	10	16		33

Cartridges.

	PROOF.			SERVICE.			
Nature.	*Diameter to hold the powder.*		*Length.*	*Diameter to hold the powder.*		*Length.*	
℔.	Inches,	Dec.	Inches,	Inches,	Dec.	Inches.	
½	9	3	12	4	6	8	
1	11	4	15	5	8	9	5
1½	12	8	17	6	4	10	
3	16		21	8		13	
4	17	2	23	8	6	14	
6	20	2	26	10	1	16	
9	22	8	29	11	4	17	5
12	24		32	12	5	19	
18	25		32	14	5	22	
24	23	7	32	14	5	22	

Note, A 24 pounder is as large a gun as, by experience, is found profitable for a ſiege.

ART. V.

Of balls and ſhot.

As it is of the greateſt importance that the weight of ball or ſhot ſhould be in proportion to the fortification of the pieces of ordnance, that in the exploſion of the powder, the force of reſiſtance of the piece ſhould be greater than that of the weight of ſhot, by which means the ſervice is not injured by the loſs of ordnance, and the lives of the men expoſed, without any kind of advantage to the ſervice they are in.

The fortification of a piece of ordnance is in proportion to what the caliber expreſſes, and is to be carefully attended to in their conſtruction at the foundery ; and before they are made uſe of for ſervice, they are generally proved with a proof charge of powder and weight of ball, which is generally double that for ſervice.

The following tables will ſhew the different proportions of ſhot, &c. in fixed ammunition for the ſeveral calibers.

Wt. and numb. of ſhot in tin caſes, for land ſervice.			Proportions of tin caſes and wooden bottoms for them.										
Nature.	*weight of ſhot.*	*N°. of ſhot in caſes.*	*Nature.*	CASES.				WOOD. BOT.				*depth of grove in the wooden bottom.*	
				Weight.		*Length.*		*Length.*		*Weight.*			
lb.	lb. oz.	N°.	lb.	oz.	dr.	inch	dec.	inch	dec.	lb.	oz.	inches	dec.
1½	1⅛	17	1½	1	14	3	90	1	50	0	2¼	0	1
3	1¼	34	3	2	4	3	90	2	40	0	4¼	0	50
4	2	28	4	3	8	4	90	2	60	0	6¼	0	50
6	1½	59	6	4	4	4	90	3	0	0	8½	0	60
9	2	63	9	5	8	6	0	3	0	0	8½	0	60
12	2	84	12	7	8	6	25	3	50	1	1	0	85
18	4	62	18	9	8	7	75	4	50	1	5	1	
24	4	85	24	13	8	8	0	5	0	2	0	1	
32	6	72	32	15	0	8	25	5	60	4	0	1	85
42	6	94	42	15	8	8	75	5	85	5	2	1	25

In quick firing the round ſhot are fixed to the cartridge, by means of a wooden bottom, hollowed on one ſide, ſo as to receive nearly half the ſhot, which is faſtened to it by two ſtraps of tin, croſſing over the ſhot at right angles, and nailed to the bottom; and the cartridge is tied to the other end of this bottom. They are fixed in a ſimilar manner to the bottoms of the grape and caniſter ſhot which are uſed in field pieces.

ART. VI.

Grape ſhot.

The ſhot is put into a bag of canvaſs or coarſe cloth, made ſo as juſt to hold the bottom; then as many ſhot as the grape is to contain, and with a ſtrong pack-thread or twine, one end of the bag is firmly tied to the wooden bottom, and is quilted to keep the ſhot from moving; and further ſecured by terminating the quilting round the pin, which paſſes through the center of the grape into the wooden bottom: when finiſhed, they are packed into boxes for tranſportation.

Grape ſhot is moſt generally uſed with iron pieces of ordnance.

ART. VII.

Caniſter ſhot.

When the ſhot are ſmall, ſuitable for field artillery, it is put into tin caſes or boxes, that juſt fit the cylinder of the gun.

It muſt be obſerved, that whatever the ſize or number of the ſhot is, which are uſed, they muſt weigh, with their bottoms and pins, nearly as much as the caliber of the piece expreſſes,

This obſervation applies to caniſter ſhot alſo.

ART. VIII.

Port Fires.

Port fires are uſed ſometimes inſtead of matches, to ſet fire to powder or compoſitions: in quick firing with field artillery, they are generally uſed, and diſtinguiſhed by wet and dry.

The compoſition of wet port fires is, *Salt petre* 4, *ſulphur* 1, and *mealed powder* 4. When the compoſition is well mixed and ſifted, it is to be moiſtened with a little lintſeed oil, and rubbed with the hands till all the oil is well mixed with the compoſition.

The compoſition of dry port fires is,

Salt petre 4lb.
Sulphur 1lb.
Mealed powder 2lb.
Antimony 1lb.

Otherwiſe,

For large port fires, the following proportions, by experience, hath been found to anſwer very well,

Salt petre, 4lb.
Sulphur 1lb.
Mealed powder 8oz.

and for ſmall port fires, *Salt petre* 3lb.
Sulphur 1lb.
Mealed powder 8oz.

The compoſitions are drove into a ſmall paper caſe and ſo kept till uſed.

ART. IX.

Fuzes for ſhells and hand grenades.

Compoſition for fuzes is,

Salt petre 3lb. 4oz.
Sulphur 1lb.
Mealed powder 3lb. 4oz. and ſome times 5lb.

Fuzes are generally made of very dry beech wood, and ſometimes of horn beam, taken near the root; the upper part of the wood ſplits eaſily.

They are turned round and bored at firſt, and then kept for ſeveral years in a dry place; the diameter of the hole is about a quarter of an inch, a little more or leſs is of no conſequence; the hole does not go quite through, leaving about a quarter of an inch at bottom, and the head is made hollow in the form of a bowl.

The compoſition is drove with an iron driver, having the ends capped with copper, to prevent the compoſition from taking fire; and drove as hard as poſſible. The laſt ſhovel full being all mealed powder, two ſtrands of quick match are laid acroſs each other and drove in with it, the ends of which are folded into the bowl, and a cap of parchment or ſtrong cartridge paper tied over it till uſed.

It will not be improper to remark, that when ſhells are to be thrown at a ſmall diſtance, the compoſition ſhould be made quicker than when they are thrown at a greater: for, by cutting them ſo as to burn but a ſhort time, they might not be long enough to be well fixed in the ſhell: by which means the blaſt of powder in the chamber would blow them out, without burſting the ſhell.

In cutting fuzes, attention muſt be paid to ſlope them ſimilar to a writing pen, ſo that the compoſition of the fuze may give fire to the powder; and the length of the fuze muſt be calculated, ſo that the ſhell will burſt nearly as ſoon as it touches the ground.

When the diſtance that the ſhell is to be thrown, is obtained, the flight of the ſhell may be computed nearly; which being known, the fuze may be cut accordingly; the ſtrength of the compoſition may be found, by burning ſome of the fuzes, and making uſe of a time piece, or a pendulum to beat ſeconds; thereby you will be able to determine what proportion will burn in one ſecond of time, *&c.*

In driving of fuzes, care muſt be taken not to ſplit them, the general way is to have a ſett at the lower end turn'd out like a cap, juſt large enough to comprehend the cap of the fuzes, which will prevent the fuze from ſplitting in driving into the ſhell, after which kill is to be put round the fuze to prevent fire from being communicated to the powder, by any defect in the vent.

ART. X.

Compoſition of kill.

Take roſin, 9lb.
Pitch, 6lb.
Bees wax 6lb.
Tallow, 1lb.

Put it in an iron pot, over a ſlow fire, diſſolve the compoſition, and incorporate the ingredients well together, then take it out and work it in the manner that ſhoe-makers do their wax, in rolls: when uſed melt it in a ladle.

ART. XI.

Shells for howitzers and mortars; ſhot for cannon, &c.

The ſhot and ſhells are generally examined and proved at the founderies where they are caſt.

Formerly they were caſt in ſand, with a core made of clay and horſe dung mixed together: This method was attended with ſome riſk in firing the ſhells from an howitzer or mortar, as the weight of metal often ſettled the mould in the ſand, and rendered them liable to be of an eliptic figure; it was the ſame with ſhot.

During the late war with Great Britain, this defect was remedied, by caſting the ſhot and ſhells in iron moulds, made to exactly anſwer the different calibers they were intended for.

In order to form the cavity of the ſhell, there were two ſemi-ſpheres, about one eighth of an inch thick, and the inſide diameter anſwering the cavity of the ſhell, and theſe two ſemi-ſpheres or globes, being put together, and confined by a piece of wire twiſted round the projection for the vent, and alſo on a little nub on the other extreme, which confined them together.

This core was filled with dry ſand, and an iron mandril put into the vent, and then placed in the iron mould, in ſuch manner as gave the proportioned thickneſs of metal in each part, and formed the outſide ſurface of the ſhell.

It happened to be my lot to be ſent on command to inſpect the caſting of ſhot and ſhells, ſeveral times, in the courſe of the late American war, at different furnaces, and I found, by attentive obſervation, that the latter method was much preferable to the former. I have inſpected ſome hundred tons and find that they are more ſolid than thoſe caſt in ſand moulds, and in dreſſing them there is not more than one half the labor.

The ſhells which were caſt in ſand and clay cores, from the great heat of ſuch a quantity of metal, vitrified the clay and ſand ſo as to render it almoſt impoſſible to clear the cavity of the ſhell, and when expoſed to wet, cauſed the greateſt difficulty to clean and dry them ſuitable for the reception of the powder.

But thoſe caſt in iron moulds, the ſand in the cavity being dry, will run out without any difficulty, and no chance to accumulate moiſture, if well plugged.

The method of proving ſhells is to put a wooden fuze in the vent of the ſhell, and plaiſter it round the vent with well wrought clay, in order to prevent the air which is emitted through the fuze into the cavity of the ſhell: when emerged into water by a pair of double blaſted hand bellows, if there is any defect, the air will penetrate through, and cauſe the water to bubble; then raiſing the ſhell out of the water, and blow with the bellows, the defect will appear by the moiſture bubbling at the place.

Thoſe ſhells which are defective, ought to be defaced, ſo as that no accident may happen from them in the ſervice.

The ſhells which ſtood proof ought to be immediately plugged up with ſeaſoned wood, in order to prevent wet from entering the cavity, and piled with the vents down excepting the under teer.

Shells, notwithſtanding they are proved at the foundry where they are caſt, are liable to accidents by tranſportation of being cracked; therefore it would be prudent to prove them again before they are filled with powder, by which caution neither the men nor pieces of ordnance are endangered.

All that is neceſſary in proving ſhot is that their diameter correſpond with the caliber they are intended for, and that they be perfectly round, which may be performed by a pair of gunners calibers, or gages, conſtructed for this purpoſe, (ſee plates.)

Tables of Shells and Fuzes, &c.

Howitzers.					Shells.							Fuzes.					
Nature.	*Powder the chamber holds.*		*Weight of the howitzers.*		*Depth.*	*Diameter of the vent.*	*Powder the ſhell holds.*		*Weight of the ſhells.*		*Wood.*	*Length of the compoſition.*	*Diameter of the ſhell.*	*Blows to each ladle full of compoſition.*	*Time of burning the compoſition.*		*Weight of the compoſition for fuzes.*
Inch	*lb.*	*oz*	*cwt.*	*lb.*	*inc*	*inch.*	*lb.*	*oz*	*lb.*	*lb.*	*inc*	*inc*	*inch.*	*blows*	"	"	*oz.*
10	3	8	24	3	7¼	1 25	3	4	85	93	9½	7	9·75	18	33	36	1 1-2
8	2	9	12	34	5⅝	1 5	2	4	38	42	8½	6	7·75	15	28	31	3-4
5½	0	9	4	12	4⅛	0 85	0	14	14	15¼	4½	4	5· 4	12	19	21	1-4
4⅖	0	4½	0	0	3⅝	0 75	0	7	7	8	4	3¾	4·48	12	15	16	

Dimenſions of powder meaſures.

			in.	dec.		in.	dec.
1 pound	meaſure	length	4	4	diameter	3	0
8 ounces	do.	do.	3	5	do.	2	4
4 do.	do.	do.	2	7	do.	1	9
2 do.	do.	do.	2	1	do.	1	5
1 do.	do.	do.	1	5	do.	1	3

In reſpect to the charges of powder, a field piece or battering cannon ought to be loaded with ; formerly it was charged with two thirds the weight of ball in powder, by experience the charge of powder from that to half; but, by more modern practice, one third the weight of ball, and leſs for fixed ammunition ; as otherwiſe, the grape or caniſter ſhot ſcatters too much for execution. This general denomination of the charge of powder, is of conſiderable advantage, not only by ſaving ammunition and the expences of tranſportation, but by keeping the guns cooler and quieter, and, at the ſame time, more effectually injuring the enemy ; for a bullet which can but juſt paſs through a piece of timber, and loſes almoſt its motion thereby, has a much better chance of rending and fracturing it, than if it paſſes through with a much greater velocity.

What has been obſerved in this chapter, may be of ſervice to the young artilleriſt when on detached duty, at a diſtance where he will not be able to get an additional ſupply on a ſudden emergency, thoſe directions here inſerted will enable him to remedy his defect of ammunition, and for further inſtruction, ſee *Laboratory duty*, in the third part.

CHAP. XXIII.

OF HOWITZERS AND THEIR PRACTICE.

THIS piece of ordnance is uſed in field duty, and, I believe, in proceſs of time, will be as much uſed as any kind of ordnance.

This kind of ordnance is generally uſed in *ricochet* firing, and performed from one degree to eight, when the ſhell will make ſeveral grazes on the ground, and its appearance, hopping along the ground, will have a tendency to break the enemy's line, to let their foe take its courſe, expecting the ſhell is to explode mongſt them, which tremor is not ſo much experienced by a cannon ſhot, on account of its velocity ; ſo that it gives them no time to reflect on their danger.

And on the nearer approach of the enemy, its effect is great by firing canniſter ſhot, in throwing ſo large a number at one charge, if properly directed.

In a ſiege they are of the greateſt importance, in firing *ricochet*, as the ſhell hopps along the ground, and drops juſt over the enemy's parapet, deſtroying them where they thought themſelves moſt ſecure. I ſaw ſeveral inſtances of this kind at the ſiege of York Town, in Virginia, in the year 1781, where the ſhells fell in this manner into the trenches which the enemy had dug in the inſide of their parapet, to encamp their troops in for greater ſecurity; but, from the croſs fire of our artillery, and the exploſion of the ſhells, ſeveral of the enemy were blown to pieces, and ſome of their limbs were ſeen from our batteries, flying in the air ; ſeveral of their battery magazines were blown up, which ruins I ſaw after the capitulation. Some of their artillery officers informed me that they loſt ſeveral men on the platforms, by this mode of firing, and thoſe ſhells which lodged in their parapet, when burſting, the exploſion made a greater havock than the cannon ſhot did, by ſhaking the works ſimilar to the ſpringing of a mine.

From what has been obſerved, the utility of the howitzers, either in the field or in a ſiege, is evident, from the importance of this manner of firing in *ricochet,* in preference to the high elevation of mortars fixed at an angle of 45°, excepting, when the battery is ſo far off that they cannot otherwiſe reach the work. When ſhells are to be thrown upon magazines, or any other buildings, the mortars ſhould be elevated as high as poſſible, that the ſhells may acquire a greater force in their fall, and conſequently do more execution. Count Buckeburg invented travelling carriages for land mortars, to throw ſhells at low elevations, as the howitzers. General Knox ordered, at the ſiege of York-Town, in 1781, ſome 8 inch mortars mounted on carriages conſtructed ſimilar to travelling carriages with truck wheels, which anſwered a very good purpoſe. But they require the carriages to be made very ſtrong, as the trunnions being on the breech of the mortar, will naturally cauſe a greater preſſure or ſhock, when fired, than it would do if the trunnions were more proportioned in the middle, as a howitzer. On that account the cheeks of the carriage always fail firſt; for this reaſon mortar beds are made much ſtronger than other carriages, they having no reaction.

It may not be amiſs to inform the young artilleriſt of the method of loading a howitzer, which is ſimilar to the charging of a mortar.

for the diſtance the ſhell is to be thrown, and put into the ſhell, and ſecured with *kilt*; the next thing to be done is to ſpunge out the piece, and charge the chamber with powder; then uncap the fuze, and pick out the end of the quick match; then take a piece of tallow, or ſome other greaſy ſubſtance; and greaſe the upper part of the ſhell, after which take the drudging box which is filled with mealed powder, and duſt the upper part of the ſhell with mealed powder; then the ſhell is put into the cylinder, and puſhed up to the chamber, and the fuze is kept in a centrical poſition in the cylinder of the piece, when the piece is primed either with powder or a tube, as a cannon, and now is ready to be directed to the object.

The proof charges for howitzers, viz.

	lb.	*oz.*
For an 8 inch howitzer,	3	8
5 1-2 inch do.	1	0
4 2-5 inch do.	0	8

We ſhall conclude this chapter with ſome tables of experimental practice, with and 8 inch an 5 1-2 inch howitzer, and a ten inch mortar, elevated at different angles; the diſtances of each graze is meaſured from where they ſtood when fired; which will give the young artilleriſt an idea of this part of duty, and the varieties in the different ranges, as alſo the cauſes of the variations in the ſhots, which will be inveſtigated when we come to treat on the theory and practice of gunnery, in the ſecond part of this work.

An 8 inch howitzer's practice at New Windſor, on Hudſon River, by order of Gen. Knox, in June, 1781, with a dead ſhell; the proof of powder, 1 oz. threw the ſhell 37 yards.

wt. of					Shells falls		*Grazes in yards.*						
Powder	*Shot.*	*Elevation.*	*flight 1.st graze*	*By pendulum ought to burn.*	*Right*	*Left.*	1	2	3	4	5	6	*Real distance.*
lb.oz.	*lb.*	°	″	″	*yards.*		- - -	- - -	- - -	- - -	- - -	- - -	*yds.*
1	48	. .	¾	9	. .	. .	42	150	180	192	222	282	306
1	. .	1	1	6	. .	. .	66	132	186	. . .	. . .	. . .	270
1	. .	2	1¼	7	. .	. .	67	153	199	243	. . .	. . .	257
1	. .	3	2	6	1	. .	108	189	. . .	. . .	. . .	. . .	260
1	. .	4	2	8	. .	. .	136	192	261	. . .	. . .	. . .	269
1	. .	5	2½	8	. .	2	125	185	. . .	. . .	. . .	. . .	261
1	. .	6	2¾	6	. .	. .	163	. . .	. . .	. . .	. . .	. . .	268
1	. .	7	3	7	. .	. .	196	263	287	. . .	. . .	. . .	299
1	. .	8	3¼	7	2½	. .	203	269	. . .	. . .	. . .	. . .	278
1	. .	9	4	. .	. .	2	. . .	. . .	. . .	. . .	. . .	. . .	276
1	. .	10	4¼	. .	3½	. .	. . .	. . .	. . .	. . .	. . .	. . .	268
1	. .	11	4¾	8	1	. .	304	346	359	. . .	. . .	. . .	379
1	. .	12	5	7	. .	. .	. . .	. . .	. . .	. . .	. . .	. . .	363
1 4	48	0	1¾	7			51	133					333
1 4		½	2	6½			67	181					294
1 4		1	2				82	172	281	306			330
1 4		2	2	5			95	259	272	296			318
1 4		3	2	6			128	224					289
1 4		4	2½	5	3		159						267
1 4		5	2	4		2	167	272	331				370
1 4		6	3	7	2		213	268	292				309
1 4		7	3	7		2	282	435					467
1 4		7	3½	10	1½		216	306	349	369			381
1 4		8	4	10	2		300	398					458
1 4		8	4	10			279	411	425				475
1 4		9	4	10½	3		319	390	412				433
1 4		9	4	8		2	336	400					422
1 4		10	4	11		4	333	397	419				447
1	42		2				115	289	365				437
1 8			2½				122	224	290	378	407	497	752
1 8		5	3				269	310	352	379	410	443	454

A 5 1-2 inch howitzer's practice at New Windſor by order of Gen. Knox, in June, 1781, with a dead ſhell, 1 oz. powder threw a 24 pound bullet of a 5 1-2 inch howitzer 40 yards.

wt. of		Elevation.	ft. of 1. graze	By pendulum.	Shell falls.		Grazes in yards.						Real diſtance
Pounds	Shell.				right	Left.							
oz	lb.	°	"	"	yds		1	2	3	4	5	6	yds
4	14½	1	1	5	2		45	110	142	161	189		201
4		2	1	10			63	129	131	197	207		331
4		3	1	7			60	118	151				194
4		4	1	10		½	91	149	203	217			292
4		5	2	10			99	156	179	204			233
4		6				1	154	225	243	279	203	313	343
4		7	2	11	1		140	189	222				
4		8	2½	11½	1		140	196	208	244	263	274	292
4		9	3	9	1		170	205	216				232
4		10	3¼	11		2	236	267	296				313
4		11	3	10	2		239	276	296				333
4		12	4	7				253					268
8		1	1	8			119	299	390	437			461
8		2	2	9			137	240	340	399			467
8		3	3	7			237	403					461
8		4	3	4	3		244	412	531	617	636	657	681
8		5	3	8	3½		250	430					
8		6	4	9		3	379	553					
8		7	5	10		2	446	580					
8		8	6			5	420	538					

At New-Winſor by order of general Knox June 1781, with a French 10 inch mortar; 1oz. powder throw a 24lb. ſhot out of an 5 and an half inch royal 40 yards.

Wt. of powder. lb.	Wt. of powder. oz.	Wt. of shell. lb.	° elevation.	" fl't 1st graze	" by calculat	fall Right yd	fall Left yd	Grazes in yards. 1	2	3	4	5	6	Real distance. yards
1		67		"	3	1		36½						122
1			1	1½	11			89	242	303	356	414	475	514
1			2	1½	13			86	211	251	267	451		500
1			3	2	12½	1⅓		123	253	335	344	399		500
1			4	2	15½			171	207	351	394	430		585
1			5	2	9			121	185	231	251			282
1			6	2¾	7½			167	285	377	418	433		441
1			7	2	9			192	244	280	334			361
1			8	4										267
1			9	3										268
1		68	10		9			367						408
1			11	5½				413	484	501	512			558
1			12	5	13			360	439	451				546
1			17½	6										482
1			26	9										675
1			30	10										688
1			36	12										800
1			40	12										763
1			45	14										834
1	8	67	1	2	3	2		127	258					340
1	8		2	2	11			142	262	362	436	485		554
1	8		3	1½	10			162	223	416	464	488		548
1	8		4	3½	12			260	391	411	454	550		660
1	8		5½	4	10			293	452	529	539			
1	8		6¼	3	10			265	447	596				
1	8		7	4	11		2⅓	268	394	514				630
1	8		5½	3	9			264	495	571				612
1	8		8	4	7			447	683					733
1	8		45	13										909
	8	67	45	8										313
	12			11										457
1	0			11½										686
1	1			10½										614
1	2			11										680
1	3			11										658
1	4			11½										655
1	5	67	45	12										735
1	6			12½										817
1	7			13										900
1	8			13										909
1	9			14										879
1	10			14										900
1	11			14½										939
2	0			19										1267

CHAP. XXIV.

OF THE FOUNDERY AND CONSTRUCTION OF BRASS ORDNANCE.

The method of caſting cannon howitzers and mortars, is but little different from that of bells; ſome run them maſſy, without any cores, being determined by the hollow of the ſhell; and they are afterwards bored with a ſteel trapan, which is worked by a horſe, or mill that goes by wind or water.

The different founders have various methods of moulding the cannon, &c. This not being the immediate duty of the artilleriſt, but, only to give the founder the proportions of the piece, and quantity of metal, that he would have the piece of ordance, which is to be caſt.

Formerly the guns were made of a very great length and on that account were very inconvenient, either to manage, or tranſport, as we are informed, this error was firſt diſcovered by accident, for ſome cannon having been caſt by miſtake, two feet and an half ſhorter than the common ſtandard, were found equally efficacious in ſervice with the common one's, and much more manageable.

This ſoon produced a very conſiderable alteration, in the form of the artillery throughout Europe, and ſtill gives room for further improvements. Their length ought to be ſuch that the neceſſary charge of powder be on fire before the ball quits the muzzle of the piece.

If it has too great a length the quantity of air to be drawn out before the ball, will give too much reſiſtance to the impulſe, and that impulſe ceaſing will increaſe the friction of the ball againſt the ſides of the cylinder of the piece, and take in proportion from its motion; therefore due attention ought to be paid, in proportioning the length of them, which will conſequently reduce the weight in the ſame proportion, and make the field artillery of more utility.

Cannon have been in the preſent century generally diſtinguiſhed by the diameter, or weight of the ball they carry; a gun which carries a bullet weighing 24 pound is called a 24 pounder. &c.

In the conſtruction of cannon, there is as great a degree of propriety that the artillery pieces be proportioned by the ſhot, as in architecture to conſtruct the ſeveral parts of a column from its diameter, therefore the caliber of the ſhot is divided equally into 24 parts, and on this ſcale are the following conſtructions.

It will be proper to give the names of the ſeveral parts of which pieces are compoſed, before we enter into a diſcription of the dimenons, in order that the young artilleriſt may proceed underſtandingly.

Names of the ſeveral parts of a gun.

(Plate 17, Fig. 1 and 2.)

A B.	The length of the gun.
A E.	The firſt reinforce.
E F.	The ſecond reinforce.
F B.	The chace.
H B.	The muzzle.
A H.	The caſcable.
A C.	The breech.

The ſhells being filled with powder, and the fuze being cut to the number of ſeconds requiſite to burn

C D. The vent field.
F I, The chaſe girdle.
R S. The baſe ring and ogee.
T. The vent aſtragal and fillet.
P Q. The firſt reinforce ring and ogee.
V U. The ſecond reinforce ring and ogee.
X. The chaſe aſtragal and fillet.
Z. The muzzle aſtragal and fillet.
N. The muzzle mouldings.
M. The ſwelling of the muzzle.
A I. The breech mouldings.

The cylinder or bore is that part wherein the powder and ball are lodged, and the entrance is generally called the mouth of the gun. The two cylindries parts, T are callled trunnions, which fixes the piece to the carriage;--And the handles on braſs 12, and 24 pounders, and on mortars and howitzers, are called dolphins from the fiſh whoſe form they repreſent, their uſe is in mounting and diſmounting them from their carriages, *&c.* The diameter of the cylinder or bore is called the caliber of the piece; and the windage of a gun, is the difference between the diameter of the ſhot, and the bore, which ought to be one 24th part longer than the diameter of the ſhot.

The length of a piece is generally reckoned from the hind part of the baſe ring, or beginning of the caſcable to the extremity of the muzzle.

The firſt reinforce includes the baſe ring, ogee next to it, the vent field, vent aſtragal, and firſt reinforce ring; the ſecond reinforce begins at the ſame circle where the firſt part ends, the ogee next the firſt reinforce ring, and the ſecond reinforce ring;

and the chaſe girdle and aſtragal, the muzzle and aſtragal.

The trunnions and dolphins are always placed on the ſecond reinforce; the firſt, that the breech may weigh ſomething more than the muzzle part, which will cauſe it to ſteady the carriage when fired.

The dolphins are ſo placed, that when the gun is ſuſpended by them, the breech and muzzle parts may equally poiſe.

The general rule is to divide the length of the gun into 7 equal parts; the length of the firſt reinforce A, E, is two of theſe parts; the ſecond E, F one, and a diameter of the bore, ſo that the chaſe F, B, is four of theſe parts, wanting a diameter of the bore.

The diſtance from the hind part of the baſe ring to the beginning of the bore, that is, the breech A, C, is always equal to the thickneſs of the metal at the vent.

For braſs battering pieces, let the length A B of the piece, be 18 diameters of the ſhot; make the diameter of the bore equal 25 parts, from the hind part A of the baſe ring, to the fore part D of the vent aſtragal ſet off 40 parts; make the thickneſs of metal taken from the bore at A and D, equal to 18 parts, that is, 3 quarters of the ſhot's diameter, and 9 parts, or half that thickneſs at the mouth. Then the lines drawn through theſe points will determine the figure of the gun, which therefore is cylindric from A to D, and conical from thence to the mouth.

The center line of the trunnions, croſes the center line of the bore at the right angles, and at a diſtance of three ſevenths of the total length, A B of the gun, from the hind part A of the breech; their diameter is 18 parts, as well as their length, free from the projection of the ſecond reinforce ring. The ſecond reinforce E F, is always two thirds of the firſt, A E; the breech A E, is 16 parts of the total length of the gun, which is here 43 parts; and the diameter of the ſwelling, M, of the muzzle is 6 parts diſtant from the mouth.

The breadth of the baſe ring and ogee next to it, are each ſix parts; the firſt and ſecond reinforce rings, and the ogees next to them, 5, the aſtragals and fillets, 4; cavetto at the mouth 2, 5, and the fillets one each.

The baſe rings projects the metal by two parts, the firſt and ſecond reinforce rings by one, or rather leſs; the fillets of the aſtragals by one half, and the round part is deſcribed from a center, placed in the outline of the piece.

There is a circular ſhoulder about the trunnions, whoſe diameter exceeds, that of the trunnions by 6 parts, and projects even with the ſecond reinforce rings.

Caſcable (*Plate* 17 *Fig.* 2.) the diſtance from the hind part A, of the baſe ring, to the center 6, of the button, is 27 parts, the radius of the button 9, the breadth of the quarter round, 2, the ogee 5, and the fillets one each. From the center C of the button, draw lines to the extremity of the baſe ring E, F, in which find the center O, ſo as the ærea deſcribed meets the ærea of the button, in the line C F, and touches the ſecond fillet, theſe æreas will determine the neck; the line O P, drawn through the center

O, parrallel to C A, will determine the ſecond fillet and C F, the firſt.

To deſcribe the ogee, join the extremities N Q, of the fillets; through the point Q, draw the line R P. parallel to O N, produced; in theſe two lines find the center P, ſo as the ærea deſcribed through the points N Q, meet in the middle of the line N Q; The ærea which determines the quarter round is deſcribed from a center R, in P Q, produced ſo as to meet the extremity F, of the baſe ring within one part. The ſhell is 6 parts broad, and the diameter of the vent a fifth part of an inch.

Muzzle, (*Plate* 17 *Fig*. 3.) Take the line B K. equal to 20 parts and erect the perpendicular I K. after having made L P, equal to ſix parts, the center I, is to be found ſo as the ærea deſcribed through the point K, ſhall meet the point L; and if through A, at 4 parts diſtant from H B, the line A R, be drawn perpendicular to L P, the center R, is to be found ſo as the ærea deſcribed through the point L, may meet the extremity of the fillet A.

The cavetto is no more than a concave quarter round.

It may not be amiſs to obſerve that a cubic foot of gun metal weighs 459 pounds, or 192 cubic inches in 61 pounds; conſequently the weight of the ſhot of any guns weight, according to this conſtruction, multiplied by 126, and the product divided by 112, gives the weight of the gun.

Several authors are much in favour of battering guns having chambers; they obſerve that thoſe pieces require a leſs charge of powder than thoſe without chambers and produce the ſame effect. This we find verified in howitzers, the ſpunges may be formed to ſuit the chamber, and the other part of the cylinder at the ſame time; The following proportion is given for the chamber of a 24 pounder and upwards, the diameter ſhould be two thirds the diameter of the bore, and length equal to that diameter, which contains but one ninth part of the ſhot's weight of powder. The conſtruction for light field pieces, let the length A B of the pieces be 14 diameters of the ſhot, the thickneſs A C of the breech 14 parts, the diſtance A D 39; the thickneſs of the metal at the vent A D 16, and 8 at the mouth; the diameter and length of the trunnions, each 16 parts, and the reſt of the conſtructions as in the firſt.

The light 12, 18 and 24 pounders on this conſtruction, would anſwer very valuable purpoſes in field duty, and in private expeditions for battering pieces being light, they would not impede the celerity of the troops, in bad roads, and uneven ground; and the char ge of powder being one quarter the weight of ſhot, it ſaves a quarter part in the expenditure of powder, and alſo the tranſportation: much might be ſaid in favour of the light conſtructed pieces, but their utility muſt be obvious to every one who pays attention. See further obſervations in the ſecond volume, on the theory, charge and effects of gun powder.

In this conſtruction there is about 85 pounds of metal for every pound of ſhot's weight, and computed by the ſame rule as before.

The conſtruction of mortars, plate 18, fig. . Mortars are diſtinguiſhed by the diameter of the bore. The diameter of the bore of a ten inch mortar is ten inches, *&c.*

The principal parts of a mortar are on the outſide of the chaſe A, the reinforce B, the breech C, and the trunnions D.

In the inſide, the part where the ſhell is lodged, is the bore, or cylinder, and the part where the powder is lodged is called the chamber. The following proportions I think are the moſt judicious conſtructions, as the mortars are not loaded with ſuperfluous mouldings and metal.

General dimenſions of land mortars.

Diameter of the	bore,	30.	30.	30.
	chamber,	10.	10,	10.
Length of the	bore,	54.	45.	40.
	chamber,	22.	21.	20.
From the end of the chamber to the end of the mortar,		16.	15.	14.
Total length of the mortar,		92.	81.	74.
From the mouth A, to the reinforce B,		30.	26.	22.
Length of the reinforce B C,		18.	14.	14.
Brdth. of the	muzzle ring & fillets,	3.5.	3.	3.
	ogee next to it,	3.	2.	2.
From the ogee to the muzzle aſtragal,		5.	4.	3.
Breadth of the	aſtragal & fillets,	2.5.	2.	2.
	ogee before the reinforce,	3.	2.	2.
	two ogees and fillets behind the reinforce	6.	5.	4.
Thickneſs of metal	at the muzzle,	5.	4.5.	4.
	near the reinforce	6.	5.	4.5.
Thickneſs of metal at the	reinforce,	7.	5.5.	5.
	chamber,	12.	12.	12.
	muz. ring	6.5.	5.5.	5.

Diameter of the trunnions,	14.	13.	12.
Lth. of the trunnions from the mortar	15.	14.	13.
Chamber contains powder	$\frac{d.}{421}$	$\frac{d.}{442}$	$\frac{d.}{400}$
Weight of the mortar	$\frac{5d.}{6}$	$\frac{2d.}{3}$	$\frac{3d.}{5}$

Note, The chamber is cylindric, and the bottom a ſemiſphere; the round part of the mortar is deſcribed from the ſame center as the bottom of the chamber. The letter D in the contents of the chamber, and that of the weight of metal, expreſſes the cube of the diameter of the bore in inches; that is, $d=2197$ in a thirteen inch mortar, and $d=1000$ in a ten inch. And, as obſerved in the conſtruction of guns, that 192 cubic inches weigh 61 pounds of metal, we get 22605. But as the diameter *d* is divided into thirty equal parts, then, as the cube of 30 is to the cube of *d*, ſo is 22605, to the weight of the mortar of the firſt ſort, it will be found to be nearly $\frac{5}{6}$ *d*. In the ſame manner are found the weight of the other two mortars.

The following table will ſhew the weight of the mortars, and the weight of powder neceſſary to charge them on this conſtruction.

Diam.	13		10		8		6	
Weight	*Metal.*	*Powder.*	*Metal.*	*Powder.*	*Metal.*	*Powder.*	*Metal.*	*Powder*
Firſt	16 1 10	5 3	7 1 21	2 6	3 3 6	1 3	1 2 11	0 8 2
Second	13 0 0	4 15	5 3 22	2 4	3 0 0	1 2	1 1 0	0 7 8
Third	11 3 0	4 11	5 1 12	2 2	2 2 27	1 1	1 0 15	0 7 8

The general conſtruction of howitzers, plate 19, fig. 1, is a very great improvement on the mortars, in many parts of ſervice. They differ from the former in having their trunnions placed nearly in the middle, and being mounted on travelling carriages ſimilar to guns.

Their general dimenſions are,

Diameter of the bore,	30.	30.	30.
Length of the bore,	90.	90.	97.5
Diameter of the chamber,	15.	15.	15.
Length of the chamber,	33.	33.	33.
From the muzzle A to the reinforce B,	50.	50.	54.5
Length of the reinforce B C,	34.	34.	37.
From the reinforce C to the end of the howitz,	50.	50.	50.
Total length of the howitz,	134.	134.	141.5
Thickneſs of the metal at the muzzle,	8.	7.	8.
Thickneſs near the reinforce,	9.	8.	9.
Thickneſs at the reinforce,	10.	9.	10.
Thickneſs at the chamber,	16.	15.	16.
Breadth of the muzzle, and baſe-ring, fillets included,	5.	5.	5.
Breadth of the ogees, that behind the reinforce excepted,	3.5	3.5.	3.5
Diſtance between the muzzle and breech, ogee and aſtragals,	6.	6.	7.
Breadth of the aſtragals and fillets,	3.	3.	3.
Breadth of the ogee behind the reinforce,	6.	6.	6.

The muzzle and baſe-ring projects the metal by	1.5.	1.5.	1.5.
Length of the trunnions,	18.	18.	18.
Diameter of the trunnions,	15.	15.	15.
Diſtance of the trunnions from the fore end of the reinforce,	5.	5.	5.
	d.	*d.*	*d.*
The chamber contains the powder,	116	116	116
Weight of the howitz,	2.25*d*	1.97*d*	2.4*d*

The caſcable is 24 parts long, the radius of the buttons 8, the ogee and fillet included 4.

TABLE

Of the weight of Howitzers and Powder.

Diamet.	13		10		8		6	
Weight	*Metal*	*Powder*	*Metal*	*Powder*	*Metal*	*Powder*	*Metal*	*Powder*
First	44 0 13	18 15 0	20 0 9	8 9 14	10 1 0	4 6 9	4 1 5	1 13 12
Second	38 2 8		17 2 3		9 0 0		3 2 24	
Third	47 0 7		21 1 14		10 3 13		4 2 6	

Theſe tables of the weight of mortar and howitzes, ſhews at one view, to the young artilleriſt, the rule of proportioning and conſtructing any piece of ordnance and their carriages by the ſame ſcale, as alſo the mortar beds. It is to be obſerved, that the bore of the mortars and howitzes is to be divided into 30 equal parts to form the ſcale of conſtruction.

The compoſition of gun metal. There is a great variety in proportioning the different kinds of metal, viz. To 240lb. of metal fit for caſting, they put 68lb. of copper; 52lb. of braſs, and 12lb. of tin. To 4200lb. of metal fit for caſting, the Germans put $3687\frac{33}{41}$lb. of copper $204\frac{12}{41}$lb. of braſs, and $307\frac{36}{41}$lb. of tin. Others uſe 100lb. of copper, 6lb. of braſs, and 9lb. of tin. While ſome uſe, 100lb. of copper, 10lb. of braſs, and 15lb. of tin.

It would be a happy circumſtance, if there could be diſcovered an alligation of metal which would require equal fuſion to render braſs ordnance more durable in ſervice.

As the copper requires a red heat to melt, and tin melts in a common fire, when a gun is much heated by firing, the tin melts or ſoftens ſo much that the copper alone ſupports the force of exploſion, whereby they generally bend at the muzzle, and the vents widen ſo much as to render the gun uſeleſs.

If genuine caſt iron, ſuch as is uſed by the Carron Company in Scotland, could be procured in the United States, I think it would be preferable to the alligation uſed in braſs ordnance, as the guns might be formed on a lighter conſtruction than the braſs ones, by which there would be a very great ſaving in the expence; and likewiſe, the guns on the new conſtruction would be more manageable, as the ſpecific gravity in iron is lighter than braſs,* and requires fewer men to manage a piece. The advantage of uſing iron guns in the field inſtead of braſs, if made of good iron, is, that they are much more durable, and that the expence is leſſened in proportion to the coſt of braſs to that of iron, which is nearly eight to one.

The iron ſuitable for this purpoſe is, what the founders call grey iron, which will bear hammering; the beſt I have ſeen of this kind, is that of Salſbury, in the ſtate of Connecticut. As many parts of the United States abound with iron ore, I doubt not. by making proper reſearch, ſome may be found equal in quality to that worked by the carron company; which would be a great acquiſition to the foundery of our ordnance. The ſpace allotted for this chapter will not admit of enlarging; but what is here ſtated will give the young artilleriſt a tolerable idea of this part of his ſtudy, and by experience he may be able to make further advances in bringing the conſtruction and foundery of ordnance to a greater perfection, and thereby render his country an eſſential ſervice.

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* The ſpecific gravity of copper is 9000 oz. Tin 7220 oz. Caſt braſs 8000 oz. Gun metal 8784 oz. caſt Iron 7425 oz. in a cubic foot. Thus a cubic foot, or 1728 inches of gun metal, weigh 8784 oz. or 549lb: then ÷1728 by 9=192 inches and ÷549 by 9=61lb. Hence 192 cubic inches of gun metal weigh 61lb. Again 1728 cubic inches of caſt Iron weighing 7425 oz. or 464lb. nearly; then 1728÷ by 16=108, and 464÷by 16=29, hence 108 cubic inches of caſt Iron weigh 29lb: this explains the theorems in finding the weight of the ordnance.

CHAP. XXV.

OF THE CONSTRUCTION OF FIELD CARRIAGES FOR ARTILLERY.

Mr. Muller obſerves, that as field pieces are now much ſhorter and lighter than the former conſtruction, yet their carriages are in the ſame proportion, they have the ſame form, but their wheels are only four feet two inches high, which, in my opinion, is too low: for the draught of low wheel carriages is known to be greater than thoſe which are higher, and more inconvenient in ſpunging and ramming down the charge; and though the guns are lighter, yet that is no reaſon why the draught ſhould be greater. If they were four feet and an half it would be much better; but, it being no eaſy matter to change any thing eſtabliſhed by cuſtom, I ſhall inſert the dimenſions uſed at preſent, that the reader may ſee what has hitherto been the practice, leaving my obſervations to his judgment, either to approve or not, as he pleaſes.

The wheels and axletrees are the ſame, for an 8 inch howitzer, as an 18 and 12 pounder's carriage.

The five and an half inch howitzer's are nearly the ſame as a ſix pounder.

ARTICLE I.

(Plate 20 and 21.)

Dimenſions of carriages for field-pieces and howitzers.

CALIBERS.	8 *inch*	5½ *i*	24	12	6	3	*parts*
	I. dec.	*I.D.*	*In.D.*	*In.D.*	*I.D.*	*I.D*	
Length of cheeks,	101.0	79.0	108.0	106.0	94.0		13.4
Thickneſs,	4.5	3.5	4.5	3.7	3.0		.18
Height before,	18.0	13.0	14.5	12.7	11.0		2.18
Length of plank,			108.0	106.0	94.0		13.4
Height of ditto,	13.0		15.6	14.0	12.4		3.6
Ditto at center,	16.0	12.0	10.0	10.9	9.8		2.16
Ditto at trail,	14.0	8.5	12.0	9.2	8.4		1.16
Length of the trail,	15.0	10.5	11.0	10.5	10.0		1.22
From head to center,	43.0	29.5	10.0	45.0	40.0		11.6
Width within before,		10.0	11.5	10.0	10.0		2.1
Ditto, behind,		13.5	17.0	15.0	13.0		2.15
Trun. holes from head,	9.0	7.0					
Breaſt tranſom, length,	14.5	12.0					
Do. do. height,		6.0					
Do. do. thickneſs,	4.5	3.5					
Center do. length,	16.5						
Do. do. thickneſs,	4.5	3.5					
Trail do. length,	19.0	15.5					
Do. do. breadth,	15.0	10.5					
Do. do. thickneſs,	4.5	3.5					

Dimenſions of the wheels and axle-trees.

(*Plate* 24.)

CALIBERS.		8 *inch,*	5½ *inch,*	24	12	6	3	*parts*
		I.dec	*In. dec.*	*I.dec*	*I.dec*	*I.dec*	*I.D*	*I.dec*
Wheel's height,			48.	50.	50.	50.		
Nave's length,			12.7	15.	13.	12.7		3.
Diam.	body,		10.6	13.	11.	10.6		2.10
	middle		11.6	14.	12.	11.6		2.15
	linch		10.	12.	11.	10.		2.5
Fallics	h'ght		4.	4.7	4.	3.6		1.
	brdth		3.	3.3	2.8	2.4		.16
Spokes	brdth		2 *to* 1½	2.	1.8	1.7		.9
	thick.		3 *to* 2	3.5	3.2	2.9		.17
Lnth. of ax tree			72.	68.	72.	76.		
Body	length,		4.	39.	40.	42.		
	breadth		5.5	6.	5.5	5.		
	height,		6.5	8.	7.	6.		
Arms length,			14.	18.	16.	15.7		
Diam.	body		6.	6.	5.5	5.		
	linch		3.5	4.	3.5	3.		

Theſe dimenſions are in inches and decimal parts, except thoſe general ones in the ſeventh column, which repreſent the diameter of the ſhot and parts, the whole diameter being divided into 24, as in the conſtruction of guns.

The length of the plank is here 13 diameters of the ſhot, and four parts. The width within of theſe carriages may be more or leſs as the thickneſs of metal is varied.

Screws being uſed to raiſe the breech of light pieces, inſtead of wedges, for which reaſon the center tranſom is two diameters broad, and but one thick;

it is placed in the middle, of the height of the cheeks at center, ſo that the neck of the caſcable anſwers to the middle of the breadth of the tranſom, the ſcrew being fixed in it.

It muſt be obſerved, that on each ſide of theſe carriages is a locker, or box of two feet long, its upper ſurface even with, or about an inch above the upper part of the axeltree, extending from thence towards the trail; and its depth is equal to the height of the axeltree.

Theſe lockers ſerve to hold ſhot on a march, and are each covered by another box that ſlides on, and is faſtened with a belt, in which cartridges are lodged to be ready for piercing at any time, without having recourſe to the ammunition cart or tumbrel.

In the conſtruction of carriages, attention muſt be had to the ſtrength of them; and that the piece may be properly elevated; a 24 pounder may be elevated to about an angle of 9 deg. and the leſſer ones to 10°, 11°, 12°, which is more than ſufficient on all occaſions.

The thickneſs of the cheeks are 18 parts inſtead of the caliber. The charge of powder which is now made uſe of, does not exceed one third the weight of ball, and even that quantity is more than neceſſary, in many parts of ſervice, in firing, which will be illuſtrated in the theoretical and practical part of duty.

The length of the cheeks of the carriage, muſt, in ſome degree, be proportioned to the length of the gun, as their conſtruction oftentimes vary. The cheeks muſt not be bent too much, as they will become very weak in the center, and care muſt be taken that the carriage will admit the piece to be depreſſed about one degree below the horizontal line.

The trunnion holes muſt be ſo as one half are over the axletree, whereas the common practice is to make them juſt without, which occaſions the weight of metal to hang too much beyond the center of the wheels.

ARTICLE II.

Of iron work for carriages.

It is neceſſary that the young artilleriſt ſhould be acquainted with the iron work of field carriages, and the uſe thereof.

Tranſom bolts with burrs	breaſt	1
	center	2
	trail	2
Tranſom plates with hooks	breaſt	2
	center	2
	trail	2
Trunnion plates		2
Cap ſquares with joints		2
Spring keys with chains and ſtaples,		4
Eye bolts,	fore, ...	2
	hind, ...	2
Breaſt plates, ...		2
Plates with roſes	garniſh	2
	trail,	2

Garniſh	bolts, ...	2
	nails, ...	6
Axletree bands, ...		2
Side ſtraps, ...		4
Draught rings with bolts and burrs,		2
Locking plates, ...		2
Lacing rings with ſtaples		8
Single fore-lock keys,		8
Bed piece chain with ſtaples,		1
Locker hinges, ...		4
Do. haſp with ſtaples,		2
Pintles plates, upper and under, ...		1

Iron work for an axeltree.

(Plate 24.)

Axle-tree bar, ...		1
Clouts,	body, ...	2
	linch, ...	2
Axle-tree hoops	linch	2
	arms	2
	body	2
Hurters with ſtraps, . . .		2

Waſhers, ...	2
Linch pins, ...	2
Axle-tree bolts, ...	1
Single fore-lock, ...	2
Clout nails, ...	13
Dog nails, ...	8

ART. III.

A limber is a two wheel carriage with ſhafts, and ſerves to ſupport the trail of field carriages by means of the pintle or iron bolt, when they are to be drawn from one place to another by horſes; they are taken off again when the pieces are to be fired.

Dimenſions. (*Plate* 22 & 23, *fig.* 1 & 2.)

CALIBERS,		24 *p'der*	12 *p'der*	6 *p'der*	3 *p'der*
		I.dec	*I.D*	*I.D*	*I.D.*
Height	hind end,	3.3	3.	3.	3.
	fore end,	3.	3.	2.5	2.5
Bolſter,	height,	12.5	10.	8.	7.
	length,	40.	40.	40.	40.
	breadth,	6.	5.5	5.	5.
Fore croſs bar	breadth,	4.5	4.	3.5	3.
	height,	2.	2.	1.5	1.5
Hind croſs bar,	breadth,	3.5	3.5	3.5	3.
	height,	2.	2.	1.5	1.5
Cr. bar diſt. fr. axle tree	1ſt. bar,	4.	4.	4.	4.
	2d. bar,	11.	11.	11.	4.
Width btwn. the ſhafts	behind,	25.	25.	25.	25.
	center,	33.	33.	33.	33.
	fore end,	24.	24.	24.	24.

Dimenſions of wheels for limbers.

CALIBER.		24	12	6	3
		I.dec	*I.dec*	*I.dec*	*I.dec*
Diameter of the wheel,				36.	
Fellows,	breadth,			3.	
	height,			2.	
Spokes,	breadth.			2.5	
	thickneſs,			1.5	
Nave,	length,			11.	
	inner diameter.			10.	
	outſide do.			8.	

The diſtance between the ſhafts, as in the above dimenſions, will anſwer as a general rule in all; but if the wood ſhould happen to be a little more or leſs crooked, the difference is not to be minded, for it is never cut acroſs the grain, becauſe that would weaken it too much. The bolſter diminiſhes towards both ends, as in the figure; ſo that the higheſt given here, is to be meaſured in the middle.

Iron work for limbers.

Limber bolt,	1	Single fore lock keys,	4
Shaft rings,	2	Nails diamond headed,	8
Shaft pins with chains,	2	Dog nails,	6
Breech hooks,	2	Bolſter hoops,	2
Ridge chains with hooks and loops,	1	Pintle,	1
		Pintle waſher,	2
Limber chains with hooks and ring,	1	Stubs for bolſter hoops	8

The iron work of the wheels and axle-tree being the ſame as before, only lighter in proportion to the wooden work.

CHAP. XXVI.

OF THE DIFFERENT KINDS OF CARRIAGES COMMONLY USED IN THE ARTILLERY.

THERE are ſeveral kinds of carriages uſed in the artillery, but to enter into a minute explanation of their ſeveral conſtructions, would require a larger ſpace than the plan of this work will admit of, we will, therefore, give the uſe of ſome of them only.

The block carriage is uſed to carry guns in the field, which are too heavy to be tranſported upon their own carriages, as likewiſe mortars, and their beds.

The ſling waggon is uſed to carry mortars, or heavy guns, from one place, or battery to another, and their ſtrength is in proportion to the weight they are intended to carry.

The ſling cart is uſed for the ſame purpoſe as the ſling waggon, to carry ordnance a ſmall diſtance, being handier to turn than a four wheel carriage.

The truck carriage is generally uſed to carry timber and other heavy burthens, from one place to another, at ſmall diſtances.

There are alſo pontoon carriages in Europe, to carry the pontoons, *&c.* to form bridges for the army to croſs rivers; but as many of our rivers in America are pretty wide, and a great deal of the country uneven, it would be attended with a great expence to incumber the army with ſuch a number as would be neceſſary to croſs ſome of our large rivers

Batteaux are, therefore, better calculated for the American ſervice, as a ſmall number will anſwer to tranſport a large number of troops in a ſhort ſpace of time, if properly conſtructed and managed: they are very eaſy tranſported from one place to another, with four waggon wheels, the axeltrees may be confined at a proper diſtance from each other, by means of a chain, or a pole and hind guide, and the boat to reſt on the fore and hind bolſters of the axletrees.

For tranſporting the artillery acroſs rivers, &c. a large flat bottomed boat called a *ſcow*, as the bow and ſtern is ſquare, for eaſy embarking and diſembarking the carriages; theſe may be carried in the ſame manner as the boats, on carriages.

The travelling forge is a neceſſary carriage for repairing any defect of iron work, neceſſary for the artillery and other parts of the army:—the uſefulneſs of this carriage induces me to inſert the proportions for the benefit of the young artilleriſt.

Dimenſions.

	Inch.		Inch.
Wheel's diameter, . . .	56	Diameter, linch, ...	3
Nave length, ...	14	Total length of the forge and bellows houſe, .	95
Diameter of the body, .	12		
do. of the middle,	13	Breadth, behind, ...	4
do. linch, ...	9	do. middle, . . .	2.5
Fellows, breadth, ...	3	do. before, . . .	2.8
do. height, ...	4	Height, behind, ...	3
Spokes, breadth, . . .	1.7	do. middle, ...	4
do. thickneſs, . . .	3	do. before, . . .	2.8
Axletree, length, . . .	76	Raves, length, ...	61
Body, length, ...	42	do. breadth, . . .	3
do. breadth, . . .	5	do. height, . . .	2.2
height, ...	6	Uprights, length, . . .	27
Arms length, ...	17	do breadth, ...	3
Diameter, body, ...	5	do. thickneſs, . .	2.2

Explanation.

Lockers, to put the tools in.

Iron plates, for the fire place.

Wooden trough, for water.

Iron plate, to receive the cinders, and to lay the hammers and tongs on.

Iron plate, to prevent the flame ſetting fire to the carriage.

Formerly there was but one pair of large wheels and ſhafts, like a tumbrel, which was very inconvenient. But now they have limbers to it, ſimilar to field pieces.

The top of the bellows houſe is covered with thin boards, riveted to broad hoops and painted canvas.

Ammunition carriages.

Tumbrels are the beſt conſtructed to carry ammunition for light field-pieces; it being a light cart, with two wheels, proportioned to carry the quantity of ammunition allowed for each field-piece, with a round top, covered with thin pine or cedar boards, rivetted to broad hoops, confined in a frame on the top of the raves of the body, and two ſtrong hinges on one ſide, ſo as to open the top, and to ſtow and air the ammunition occaſionally: the top is alſo covered with painted canvas, and confined by two hooks in the inſide, and a door in the hind part, ſecured by a lock.

Waggons are beſt calculated for the ammunition of heavy field artillery, and the ſpare ammunition of the park and army. Theſe are covered in the ſame manner as the *tumbrels*; but the top does not open: it has two doors in the hind part, ſecured by an iron bar and pad-lock.

As wheel carriages are ſo univerſally uſed in America, a particular deſcription is not thought neceſſary, and every artilleriſt ſhould make himſelf acquainted with the mechanical principles and conſtruction of all ſorts of carriages and implements neceſſary in the line of his duty.

There is a great deal required of an artillery officer, when on a detachment, at a diſtance from the park of artificers. If any of his carriages ſhould be diſabled by the enemy's ſhot, or any other accident ſhould happen to them; the commanding officer may order ſome new carriages to be conſtructed, and no other artificers than thoſe in the vicinity of the country, who are not acquainted with the conſtruction of warlike carriages, and machines; but, can work by a plan, and perform the neceſſary ſervice.

The artillery officer will conſequently be called upon to draft a plan of the conſtruction for the workmen; he would feel very unhappy to be neceſſitated to inform the commanding officer that he was not acquainted with the conſtruction, and draftings of carriages, &c. I have ſeen inſtances of this kind which very ſenſibly injured their feelings, and ſome gentlemen who thought it beneath the dignity of their commiſſions, to perplex their minds in acquiring a perfect knowledge of mechanical conſtructions.

But I can aſſure the young artilleriſt, that nothing has a greater tendency to make him appear reſpectable in his command, than a ſteady attention to be informed of that extenſive variety which compoſes the duty of an artilleriſt.

Artillery is, like all other ſciences, capable of further improvement; and the ingenious mind will always find a pleaſing theme to ſpeculate on, and make further advances to perfection in this part of ſcience.

CHAP. XXVII.

OF THE TECHNICAL TERMS USED IN THE ARTILLERY AND FORTIFICATION, WITH THEIR APPLICATION.

It is neceſſary that the young artilleriſt ſhould be acquainted with the terms in the artillery, and military architecture; and the manner of applying them.

I have here inſerted a variety of uſeful terms, both in the artillery, and field-engineering; ſome of which are ſelected out of the moſt modern authors to which I have had acceſs.

Which will enable the young artilleriſt to form an idea of the outlines of his duty, and induce him to a more minute application.

Artillery, in its general ſenſe, denotes the offenſive apparatus of war;—in its modern acception, it ſignifies fire-arms mounted on their carriages and ready for action, with their balls, their bombs, their grenades, &c. If we take the term in a more extenſive meaning, it includes the powder, the matches, inſtruments for fire-works, the utenſils of ordnance, the machines which facilitate their motion, and tranſport them: the vehicles over which they traverſe rivers, every thing neceſſary to them, and all that enters into the form of a train of artillery.

The ſame word, ſtill farther extended in its meaning, likewiſe comprehends the men deſtined for the ſervice of the artillery; the people who provide the artillery with materials and implements when engaged, the cannoniers, the bombardiers, the officers of every rank, and engineers of every kind.

By artillery is likewiſe underſtood the ſcience with which the officers of artillery ought to be acquainted. This ſcience teaches to know the nature of all the materials and ingredients which enter into the compoſition and the ſtructure of every thing relative to the artillery, ſuch as nitre, ſulphur, charcoal, the proportions of air and fire; the compoſition and preparation of gun powder, the materials for fire works, the conſtruction, proportions, &c. of the different warlike machines, the arrangement, movement, and whole management of cannon, &c. in the field or in ſieges, in ſuch a manner, that each of them, according to the length and diameter of the cylinder or bore, may be ſituated in the beſt place, and at the moſt proper diſtance for execution, and that the whole train taken together, may reciprocally aſſiſt and ſupport each other with the greateſt advantage.

Artillery-train: A certain number of pieces of ordnance, mounted on carriages, with all their furniture fit for marching.

Artillery artificers, conſiſting of blackſmiths, carpenters, wheel-wrights, harneſs makers, &c. who are always attached to the artillery park.

Artillery park. A place appointed for the encamping of the artillery, which are drawn up in lines. The firſt of which is the line of guns; ſecond the limbers; the tumbrels and ammunition waggons make two or three lines, the artificers' waggons and boat carriages, form the rear lines. The whole is ſurrounded with a rope, which forms the park.

Authors differ much where the park ſhall be formed, whether in front of the firſt line of the army, or in the rear of both lines. During the late war with Great Britain, the American park was generally formed in the center of the ſecond line of the army.

But it may be varied agreeable to circumſtances, and ought always to be poſted on commanding ground poſſible.

Artificial, in a general ſenſe, denotes ſomething made, faſhioned or produced by art, in *contradiction* to the productions of nature.

Artificial fire-works are compoſitions of inflammable materials, chiefly uſed on ſolemn occaſions, by way of rejoicing. See the third part of this treatiſe.

Aſtragal; in gunnery, is a round moulding, encompaſſing a cannon, about half a foot from its mouth.

Ammunition are all compoſitions of inflammable materials, uſed with cannon, howitzers, mortars and all other kinds of fire arms, and every kind of artificial fire works, uſed in offenſive and defenſive operations or rejoicings; alſo, bullets, cartridges, iron bombs, carcaſes, grenades; all weapons, as fire-arms, ſwords, bayonets, petards, quick and ſlow match, and every thing that may add to the deſtruction of an enemy, or ſelf preſervation.

Apron, a ſquare piece of ſheet lead, or canvas, about ſix inches ſquare, in proportion to the ſize of the piece, in order to ſecure the touch-hole or vent from the wet.

Abbatis, a defence much uſed, to defend a paſs, entrance, &c. conſiſts of trees hewn down, whoſe boughs are ſtripped of their leaves and pointed. The method of planting theſe trees is to have their trunks buried in the ground, and the boughs faſtened, by intervening them with each other. A ſmall ditch muſt be dug towards the enemy, and the earth thrown upon the lower part of them, which will add to its ſtrength, and render it very difficult, nay, impaſſable, if properly defended.

Advanced ditch, (or Foſs) A moat or ditch of water round the glacis or eſplanade of a place of arms, to prevent ſurpriſe: being drained, ſerves for a trench to the beſiegers, therefore is not now approved of.

Affut, the French name of a gun carriage. Its diſtinction from other carriages is, that it belongs to a gun.

Alarm, a ſudden challenge to arms, upon apprehenſion of danger from an enemy, or of fire. A ſudden alarm is often occaſioned by the neglect of ſentries; and ſometimes it has been done to try the readineſs of the troops,

Alarm Poſt, the place appointed for the aſſembling a regiment, troop, or company.

Acceleration, in mechanics, the increaſe of velocity in a moving body.

Accelerated motion, is that which continually receives acceſſion of velocity.

Acceleration ſtands directly oppoſed to retardation, which denotes a diminution of velocity.

Angles, in gunnery, are degrees of elevation or depreſſion, above or below a horizontal line. An acute angle is leſs than ninety degrees; an obtuſe angle is more than ninety degrees; and a right angle is ninety degrees. In fortification angles are defined, as the angle of the center, angle of the polygon, angle of the curtain, angle of the ſhoulder, flank-angle, angle of the tenail, angle forming the flank, angle forming the face, angle of the moat, angle ſaillant, or ſally angle, or what advances with its points toward the country; ſuch is the angle of the counterſcarp, before the point of a baſtion. Angle rentrant, or re-entering angle, is what points inward to the body of the place; ſuch is the angle of the counterſcarp before the center of the curtain.

Anſteſtature, a traverſe or retrenchment, haſtily made of gabions, or paliſades, to ſtop an enemy who is gaining in ground. This is, to diſpute ground, or loſe it inch by inch.

Approaches are the trenches; places of arms, lodgments, ſap, gallery, and all works whereby the beſiegers advance towards a place beſieged.

Bacule, a gate like a pit fall, with a counterpoiſe before the corps-de guard, advanced near the gates, which is ſupported by two great ſtakes.

Ball, bullet, or ſhot, is of iron or lead, to be fired out of piſtol, fire-lock, carabine, or cannon, and is of different ſizes.

Red hot balls, are heated in a forge, ſtanding near a gun. The gun being loaded with powder, and wadded with green turf, is ſpunged with a wet ſpunge, and laid at a ſmall elevation, that the ball, which is taken out of the forge with a long ladle, may ſlide down and be inſtantly diſcharged by the gunner.

Fire balls, are bags of canvas filled with gun-powder, ſulphur, ſalt petre, &c. to be thrown by the ſoldiers, or out of mortars, in order to fire the houſes, incommoding trenches, advanced poſts, or the like.

Light balls, are ſuch as diffuſe an intenſe light around, or they are balls which, being caſt out of the hand or a mortar, burn for ſome time, and illuminate the adjacent parts.

Smoke, or dark balls, thoſe which fill the air with ſmoke, and thus darken the place to prevent diſcoveries.

Stink balls, thoſe which yield a great ſtench when fired to annoy the enemy.

Sky balls are thrown up out of mortars, and when arrived at their height, burſt like rockets, affording a ſpectacle of decoration.

Water balls: Thoſe which ſwim and burn a conſiderable time in the water, and at length burſt.

Land balls: Thoſe which, being thrown out of a mortar, fall to the ground, burn, and burſt there.

Balloon or *ballon*, in a general ſenſe, ſignifies any ſpherical hollow body; among artilleriſts or engineers, a kind of bomb made of paſte board, and played off in fire-works, either in the air or on the water, in imitation of a real bomb. See the conſtruction of fire-works in the third part of this treatiſe.

Barbe, in the military art. To fire in barbe means to fire the cannon over the parapet, inſtead of firing through the embraſures; in which caſe the parapet muſt not be above three feet and an half high.

Baſe of a conic ſection is a right line in the hyperbola, and parabola ariſing from the common interſection of the ſecant plain and the baſe of the cone.

Baſe, in fortification, the exterior ſide of the polygon, or that imaginary line which is drawn from the flanked angle of a baſtion to that oppoſite to it.

Baſe of a gun, in gunnery, is the ſame with the breech of a gun, and is that ſolid piece of metal behind the chaſe, toward the caſcable: the great ring behind the touch-hole or vent, is called the baſe ring, and the mouldings behind are the baſe, or breech-mouldings.

Barrier, a gate made of wooden bars, about five feet long, perpendicular to the horizon, which is kept together by two bars going acroſs, and another croſſing diagonally: they are uſed to ſtop the cut that is made through the eſplanade before the gate of a town.

Baſtion, a part of the inner incloſure of a fortification, making an angle towards the field, and conſiſts of two faces, two flanks and an opening towards the center of the place, called the gorge.

Banket, one or two ſteps made at the foot of a parapet.

Battery. Mr. Muller obſerves, that from the known dimenſions and ſituation of a battery, the quantity and kind of materials neceſſary, may readily be aſcertained.

For if the parapet or breaſt work is 18 or 20 feet thick, and 7.5 or 8 feet high: Each gun takes up 18 feet parapet, and each end about ten; the embraſures are 3 feet from the ground, two feet wide within and 15 or 16 without; ſo that the merlons, or parts between the embraſures, are 16 feet long on the inſide, and 4.5 or 5 feet high.

The dimenſions of the *faſcines* are various; but the following are, in my opinion, the moſt convenient in many reſpects: Their diameter ſhould be 10 inches, or circumference 31.5, and their length 10.8 and 6 feet; becauſe one of 10 and of 8, makes the thickneſs of the parapet; one of 10 and one of 6, the merlons; one of 10 the ends, and one of 10 and 8, the inſide of the embraſures: laſtly, 9 layers make up the height of the parapet.

Another advantage of the above lengths is, that the end of one layer will not be over thoſe of the next above it, and they are made and carried with more eaſe than thoſe that are longer, ſuch as the French generally uſe.

Hence a battery of two pieces will be 40 feet long, and requires two faſcines of 10 feet, one of 8, and two of 6, for each layer from the ground to the embraſures, and four layers 8 of 10, 4 of 8, and 8 of 6 feet which are required for that height; becauſe four layers make 40 inches in height and the under one being ſunk about 4 inches into the ground, there remains 3 feet.

The diſtance between the two embraſures being 16 feet, requires one of 10 feet and one of 6, and each end one of 10, that is, three of 10, and one of 6, for each layer; and if we take 6 layers, 18 of 10, and 6 of 6, which makes the parapet 8 feet high; though 5 layers will be ſufficient on moſt occaſions, yet it is proper to have ſome ſpare faſcines.

The ſize of platforms are commonly 18 feet wide and 8 feet long before, next the parapet, 15 or 16 behind; the planks from 2 to 2.5 thick.

The hurters to ſtop the wheels from damaging the faſcines is 5 by 6 inches ſquare, and 8 feet long.

There are five ſleepers to each platform, to lay the planks upon, 3 by 4 inches ſquare, and 18 feet long; each ſleeper is faſtened by pickets drove faſt in the ground, two at each end and two in the middle, and the laſt plank by 4; to keep them cloſe together, there requires 34 pickets for each platform.

It being the duty of the artillery officers to ſuperintend the conſtruction of the batteries (for, certainly they ought to be the beſt judges who occupy them), therefore, for their further inſtruction, I have inſerted the following table.

Number of pieces.	Length of the battery.	Men to make the battery.	Men to make the faſcines	Tools.	Faſcines in feet 10	8	6	Pickets.	Mallets.	Hand-bills.	Platforms. Planks.	Sleepers.	Pickets.	Bavins.
2	ft. 40	50	15	70	70	48	16	590	10	12	3	10	68	50
4	58	70	25	100	120	76	32	1000	18	16	72	20	128	100
6	76	90	35	130	170	104	48	1410	26	20	108	30	192	150
8	94	110	45	160	220	132	64	1820	34	24	144	40	256	200
10	112	130	55	190	270	160	80	2230	42	28	180	50	320	250
12	130	150	65	220	320	188	96	2640	50	32	216	60	384	300
14	148	170	75	250	370	216	112	3050	58	36	252	70	448	350
16	166	190	85	280	420	244	128	3460	65	40	288	80	512	400
18	184	210	95	310	470	272	144	3870	74	44	324	90	576	450

The above table contains the number of men, and the neceſſary materials to conſtruct a battery conſiſting of from two to twenty pieces of cannon, in a night, as near as poſſible; but it is proper to have ſome faſcines and pickets to ſpare, in order to repair the battery.

Bombardiers; the third rank of non commiſſioned officers in a company of artillery: when carrying on a ſiege, they are formed in corps, and manage the mortars in the bomb battery, and work in the laboratory. Beraldus, an ancient writer, obſerves, that ordnance was formerly called bombards (a word compounded of the verb bomb, which ſignifieth to ſound, and ardes to burn) and they who uſed them were called bombardiers; which term is ſtill continued in the artillery.

Blinds are, properly, ſuch things as are uſed to cover the men in the trenches, from the ſhot of the enemy.

They are generally made with chandeliers and faſcines: chandeliers are ſmall beams with an upright piece fixed at each end, two of theſe are placed at a ſmall diſtance from each other, acroſs the trench, and the intervals between the upright pieces filled with faſcines.

This term may be applied to wool-packs, or other things uſed for the ſame purpoſe.

Briſure, a ſtraight line bent into a crooked one, with ſalliant and rentrant angle.

Capitol: an imaginary line drawn from the junction of two demigorges to the flanked angle, or point of a baſtion.

Cavalier, a maſs of earth raiſed very high, in order to command ſome place.

Circumvallation. An intrenchment ſurrounding the camp of the beſiegers from all attempts from without.

Contravallation, an intrenchment thrown up between the beſiegers and town to ſecure the camp from ſallies made by the garriſon.

Covered way, a ſpace of ground level with the country extending round the counterſcarp, and bounded on the other ſide by the glacis.

Counterſcarp, the outer edge of the ditch.

Crown work, a large piece of fortification made outſide the body of the place, to incloſe a ſuburb, *&c.* It conſiſts of two branches, a baſtion and two half baſtions.

Curtain; a ſtraight line between two baſtions, redans or other projecting pieces.

Corronade, a ſhort kind of ordnance, capable of carrying a large ball, and uſeful in cloſe engagements at ſea.

It takes its name from the place where this ſort of ordnance was firſt made, or the principle applied to an improved conſtruction.

Caſement is a bomb proof work, made under the rampart, like a cellar or cave, with loop-holes to place guns in.

Caſcable. See conſtruction of braſs ordnance.

Chamade. See ſignals and beats of the drum.

Ceſſation of arms, is when the beſieged wiſhes to parley, in order to make propoſitions to the enemy for capitulation: a white flag is planted on the breach and a chamade beat, at which both parties ceaſe firing and all other acts of hoſtility, until the propoſals are either agreed to or rejected.

Capitulation is the agreement made by the beſieged with the beſiegers, on what condition the place ſurrenders. If the articles are agreed to and ſigned, hoſtages on both ſides are delivered, for the exact performance of them.

Eſplanade, an open piece of ground, but moſt uſually applied to that void ſpace, always left between a citadel and the town it is intended to command.

Engineer, in the military art, is an able expert man, who, by a perfect knowledge in mathematics, delineates upon paper, or marks upon the ground, all ſorts of forts and other works, proper for offence or defence. He ſhould underſtand the art of fortification, ſo as to be able not only to diſcover the defects of a place, but to find a remedy proper for them; as alſo how to make an attack upon, as well as to defend the place. Engineers are extremely neceſſary for theſe purpoſes, wherefore it is requiſite, that, beſides being ingenious, they ſhould be brave in proportion. When at a ſiege, the engineers having narrowly ſurveyed the place, they are to make their report to the general, by acquainting him which part they judge the weakeſt, and where approaches may be made with moſt ſucceſs. Their buſineſs is alſo to delineate the lines of circumvallation, taking all the advantages of the ground; to mark out the trenches, places of arms, batteries, and lodgements, taking care that none of their works be flanked or diſcovered from the place. After making a faithful report to the general of what is doing, the engineers are to demand a ſufficient number of workmen and utenſils, and whatever elſe is neceſſary.

Fauſſebraye, a low work in the ditch, running parallel to the faces, flanks and curtains, and having a parapet.

Fiſhant. All fire is diſtinguiſhed into two kinds, Fiſhant and Raſant; the firſt is when the ball ſtrikes any thing perpendicular or obliquely; the ſecond when it ſkims along its ſurface. There are two ſpecies of each, vertical and horizontal.

Fleche, a piece of fortification advanced before another and reſembling an arrow, from whence it has its name, the two faces forming the head, and the communication to the ſhaft.

Fraiſes, are ſtakes drove into an earthen rampart with the points inclined downwards; the uſe of them is to obſtruct an enemy attempting to climb up.

Face of a gun, the ſuperficies of the metal at the extremity of the muzzle of the piece.

Fanion, ſmall flags carried with the baggage of the artillery.

Fire maſter. An officer who gives the direction and proportions of ingredients for each compoſition required in fire works.

Flank of an army, battalion, troop or company, is their right or left extreme part.

Fortification: A name for any work made to oppoſe an enemy; put in ſuch a poſture of defence, that every one of its parts defend and are defended by another.

Gabien, a cylindrical baſket, open at both ends. The men working in the trenches place them on the edge next the town, and throw the earth into them.

Genomillenes, that part of a parapet which forms the bottom or ſole of an embraſure.

Glacis, the moſt external part of a fortification, ſurrounding the whole, and ſerving as parapets to the covered way where it is ſix feet high, with a banket, but gradually ſlopes towards the country, till it imperceptibly loſes itſelf.

Gorge, ſee baſtion.

Horn-work, an advanced piece, having ſome reſemblance to a crown-work, except that its front has only two half baſtions.

Horn, which the gunner carries in order to prime the piece with; when firing with paper cartridges, it hath a braſs ſtopper and ſpring, to prevent fire communicating to the powder in the horn; there is a ſhoulder-belt about three inches wide, fixed to ſling it by, in which is placed the priming wire, gimblets, pincers, ſteel ſpikes and hammer.

Hair cloths, to cover powder in waggons, batteries, fixed bombs, hand grenades, *&c.*

Head of a work, the front of it next to the enemy.

Head of a camp, the ground before which the army is drawn out.

Hendecagon, a geometrical figure containing eleven ſides, and as many angles.

Heptagon, a figure capable of being fortified with ſeveral regular baſtions.

Hexacon, a figure of ſix ſides, capable of being fortified with ſix baſtions.

Hides, tanned, are always carried along with an army, eſpecially in the fire-workers' ſtores, to protect powder or bombs from rain; they are alſo uſeful upon batteries or in laboratories.

Howitzer. An improvement on the mortars being a German invention, it is mounted like a gun on a travelling field carriage, and differs from the mortar in having the trunnions in the middle. See conſtruction of ordnance.

Hobits, ſmall mortars of about 6, 7, or 8 inches diameter, reſembling a mortar in every thing but their carriage, which is made in the form of thoſe for guns, only ſhorter:—they march with the guns, and are good for annoying the enemy at a diſtance, with ſmall bombs, or in keeping a paſs; being loaded with cartouches, which are caſes of wood about three inches thick at bottom, girt round with marline, holding about 400 muſket balls, beſides ſix or eight balls of iron, of a pound weight.

Hurdlis or *clayes*, made of branches or twigs, cloſely interwoven, are about five or ſix feet long and three or three and an half broad. Their uſe is to cover traverſes, lodgments, capooners, coffers, &c. and are covered over with earth to ſecure them from the enemy's artificial fire works, or ſtones which might be thrown upon them. They are alſo frequently uſed to cover marſhy ground, or paſs a foſſe.

Horizontal range; the level range of a piece of ordnance, being the line which it deſcribes parallel to the horizon.

Horizontal ſuperficies: the plain field, which lies upon a level, without ſinking or raiſing.

Honey-comb; flaws and defects in the charged cylinder of a cannon; a fault in caſting the piece.

Helix, in geometry, a ſpiral line.

Handſpike ; a lever of wood, about five feet long, with a plate of iron rivetted on one end, with claws, in order to traverſe heavy ordnance, mounted on garriſon carriages on a platform.

Heriſſon, in fortification ; a beam armed with a great number of iron ſpikes, with their points outwards, and ſupported by a pivot on which it turns. Theſe ſerve as a barrier to block up any paſſage, and are frequently placed before the gates, and more eſpecially the wicket doors of a town or fortreſs, to ſecure thoſe paſſages which muſt, of neceſſity, be often opened and ſhut.

Herſe, in fortification, a lattice, in form of a harrow, beſet with ſpikes. It is uſually hung by ropes, faſtened to a maulinet ; to be cut, in caſe of ſurpriſe, or when the firſt gate is broken with a petard, that the herſe may fall, and ſtop up the paſſage of the gate, or other entrance of the fortreſs : The herſe is alſo called a *ſaraſin* or *cataract* ; and when it conſiſts of ſtraight ſtakes, without any croſs bars, it is called orgnes. It is alſo, for want of chevaux de friſe, laid in the way, in breeches with the points up, to incommode the march of both horſe and infantry.

Haverſack, which a gunner or matroſs carries flung by a ſhoulder-belt on their ſide, filled with cartridges. See the exerciſe of field pieces.

Jack ; an engine much uſed about guns or mortars, and always carried with the artillery, for raiſing the carriage, &c.

Inveſting a place ; the firſt operation of a ſiege, is to ſurround it with troops, ſo as to prevent any thing entering into, or being carried out of it.

Inſult: a work is ſaid to be inſulted, when attacked ſuddenly and openly.

Indented lines: a line running out and in, like the teeth of a ſaw, forming ſeveral angles, ſo that one ſide defends another. They are uſed on the banks of rivers, where they enter the town.

Joint-bolts, iron bolts which fix one end of a cap ſquare to the carriage.

Keys, forelock, keys with chains, keys, ſpring: ſee the conſtruction and iron work of carriages and mortar beds.

Line of defence, An imaginary line, being the face of a baſtion, continued to the flanking angle.

Lunette, two ſmall ravelins partly covering the faces of a large ravelin. They derive their name from their reſemblance to lunettes, or ſpectacles, ſuppoſing the ravelin to be a noſe.

Laboratory, in gunnery, ſignifies the place where fire workers and bombardiers prepare their ſtores. There is ſometimes a large tent carried along with the artillery to the field for this uſe, with all ſorts of tools and materials, and is called the laboratory tent.

Lint-ſtock, a ſtaff of wood about three feet long, open; at one end of which is a piece of iron that divides in two turnings from each other, having each a place to receive a match, and a ſcrew to keep it faſt; the other pointed and ſhod with iron, to ſtick into the ground.

Locking plates, ſee iron work in conſtruction of carriages.

Loop holes, ſquare or oblong holes made in the wall to fire through with muſkets.

Magazine, or arſenal, where all ſtores are kept, guns founded, and carpenters, wheel-rights, ſmiths, turners, and other handcrafts, conſtantly employed in making all things for the artillery.

Maxims in fortification are general rules, eſtabliſhed by engineers founded on reaſon and experience, which being exactly obſerved, a place fortified according as they direct, will be in a good poſture of defence. Although authors agree on the general form in the preſent manner of fortifying, yet they differ moſtly in the particular conſtruction of the parts.

Mines, a lodgement made under ground, to place powder in; which is ſet on fire to blow up the works above it. The difference between mines and counter mines is, that the firſt are made by the beſiegers, and the latter by the beſieged.

Two ounces of powder will blow two cubic feet of earth, and conſequently, 200, or 12½lb. will raiſe two hundred ft. of earth, which is nearly 200 yards cubic. The miner ſhould obſerve, that his powder exerts its force againſt the weakeſt part: therefore, no hollow ſhould be near the chamber of his mine, but at leaſt one and a half of ſolidity more than is above the mine he would blow up. To counter-mine, or blow up the enemy's mines by petards, and bury their powder, ſauſages, and ſometimes the miners, or drive them out by ſmoak of ſulpher, or other ſuffocation, if they are above you.

Note, the powder will raiſe with equal quantities the meaſure of wall or earth.

Moat, ditch, or foſſe, a depth or trench round the rampart of a place to defend it, and prevent ſurpriſes.

Ordnance is all kinds of cannon, mortars, howitzers, &c.

Ordnance ſtores, conſiſts of every kind of ammunition, combuſtible of fire works, apparatus for the ordnance, tools for the artificers, and materials, viz.

Aprons of lead, axletrees bound ſpare, for 12, 9, 6 and 3 pounders, ditto for tumbrels and forges; axes, broad, narrow and pick-axes; bags for ſhot, flints and ſpunges; barrels budge, bayonets, barrows, wheel and hand; beds for guns and mortars, bridles, bills to cut faſcines with and buckets of leather. Carriages travelling, with limbers, compleat for 12, 9, 6 and 3 pounders, for 8 inch howitzers; cartridges for 12, 9, 6 and 3 pounders, for howitzers: ditto with round ſhot fixed for 12, 9, 6 and 3 pounders; empty paper cartridges for 12, 9, 6 and 3 pounders; cartridges for muſkets: carts, ammunition, forges; candles, wax and tallow; crows, iron; canteens, cartouch boxes; cloths, hair and oil; clouts, body and linch: chains, draught, for 12, 9, 6 and 3 pounders, and for howitzers; coals, charcoal, ſea-coal, colours, quarter, with ſtaves; cords, whip, —lb; coins, for 12, 9, 6 and 3 pounders; and for howitzers; couples of chain traces. Deal boards and drums. Eſſes for draught chains. Fifes, flags, flambeaux, flints for muſkets, carbines and piſtols; formers for 12, 9, 6 and 3 pounders, and for muſket cartridges; fore key. Glue, —— lb. greaſe, firkins; gins compleat. Hammers, claw and ſmall; handſpikes, hand ſcrews, and hand grenades, fixed and empty; horſe, harneſs, traces, collars, ſaddles, breachings, bit-halters, *&c.* harneſs for men to draw the heavy cannon with; hatchets, haverſacks and helves for ſpare pick-axes; heads for drums; hemp —— lb. hides tanned; hooks, pairs, car ſlings; hoops, hazle; horns for powder, *&c.* Iron, flat bars, hoops, rods, ſquare iron, priming wires, and irons for marking horſes. Kettles, copper, with covers; key ſprings. Ladles and worms for 12, 9, 6, 3 pounders; ditto for howitzers. Lanterns, dark, Muſcovy and ordinary; limbers, ſpare, for 12, 9, 6 and 3 pounders; ditto for howitzers; links, dozens; line, for drum cords; lint-ſtocks with cocks, ditto without; locks, ſplinter, pad; linch pins, pairs. Marline, tarred, ſheets, white; mauls, large wooden; matches, lb. of ſlow, quick; meaſures for powder made of copper, from three lb. to half an ounce, from 8 ounces to quarter ſetts; meaſures for coal, 1 buſhel; medicine cheſts, mortars of different calibers; moulds for carbines, piſtols, muſkets do. muſkets. Nails different ſizes, ditto clout, copper, dog ſtreak. Ordnance, braſs, 12, 9, 6, and 3 pounders. Pannels for carry mortars; paper, fine, reams; picket-line, ropes, 2 and a half inch quoils; pickets for the park ſhod; petards fixed; pails, wooden; pontoons and carriages; powder, corned, barrels; portfires, dozens; portfire-ſtocks. Ring for fire-locks; rods for muſkets, carbines, piſtols; ropes, drag, for 12, 9, 6, and 3 pounders; ropes tarred, 2½ inch——feet; ropes, white, quoils, 5, 4, 3½, 2 inch; ſaws, croſs cut, hand ſaws, fine ſaws, and compaſs do. Scales, braſs, pairs; ſcrews for guns, 12, 9, 6, and 3 pounders; ſhells, empty, do. filled; ſheep ſkins; ſhovels; ſhot, lead for, muſkets, carbines, piſtols, tons; ſhot, round, for 12, 9, 6, and 3 pounders; ſhot, grape, for 12, 9, 6, and 3 pounders; ſlings for guns, pairs; ſpikes for do. ſpades; ſpunges with rammers; ditto for howitzers, mortars; ſtaves for flags, ladles; ſhot for caniſter; ſteel; ſticks for drums, pairs; ſteelyards with weight to weigh hundreds; ſwin trees, pairs, tompeons, with collars for 12, 9, 6 and 3 pounders, and howitzers. Tilts, wad mills; tarpaulins; tents, field officers, captains, ſubalterns, horſemens, French, bell laboratory; thread, fine, pack, lb; tools for artificers cheſts, carpenters, wheelers, ſmiths, tinmen, collar makers, coopers, miners; tube boxes; tubes for 12, 9, 6 and 3 pounder tumbrels; twine, lbs; tug pins, ſpare pairs; ditto for howitzers, forge, or tumbrels. Wad-hook (or worms) for 12, 9, 6, and 3 pounders; waſhers, pairs; weights, braſs; whips for drivers.

Laboratory ſtores, Fixed fuſes for different calibers; iron drills for fuſes do. hand mallets of different kinds for do. ſmall copper ladles for do. ſetters of wood for fuſes; mealed powder, *lb.* ſulphur, ſublimate, *lb.* compoſition for fuſes, *lb.* quick match, *lb.* port fires, rockets of 2*lb.* for ſignals, rods for do. canvas, ells, cotton wick, *lb.* ſpirits of wine, gallons, cutting knives, raſps with handles, pincers for fuſes, ſmall handſaws, copper ſatting boxes, flannels for ſhells, melting ladles of ſorts; mealing tables, truſſes for do. rubbers for do. hand bruſhes, ſieves with tops and bottoms lawn; drawing knives, quadrants, machine to draw fuſes. Kilt, *lb.* kettles. Laboratory cheſt, with padlock and key. Mould for rockets, portfires, *&c. &c.* This will give the young artilleriſt a general idea of the variety that is in the ordnance department.

Orillon, part of a baſtion near the ſhoulder, ſerves to cover the retired flank from being ſeen obliquely.

Out works, advanced works, detached and interior works; works of ſeveral kinds which cover the body of the place; as ravelins, half moons, tenailles, horn-work, crown works, counter-guards, envellopes, ſwallow tails, lunettes.

Parallels, at a ſiege the trenches or lines made parallel to the defence of the place beſieged; they are alſo called lines of communication and boyans; *parallel*, or place of arms, deep trenches 15 or 18 feet wide, joining the ſeveral attacks together, ſerve to place the guard of the trenches in readineſs to ſupport the workmen when attacked. There are uſually three in an attack; the firſt about 300 toiſes from the covered way; the ſecond and third nearer on the glacis.

Parapet; an elevation of earth, deſigned for covering the ſoldiers from the enemy's cannon or ſmall ſhot; its thickneſs is from 18 to 20 feet; its height 6 on the inſide, and 4 or 5 on the ſide next to the country. It is raiſed on the rampart and has a ſlope, called the ſuperior talus, or glacis of the parapet, on which the ſoldiers reſt their muſkets to fire.

Profile is the repreſentation of a vertical ſection of a work; it ſerves to ſhew the dimenſions which cannot be repreſented in plans, and is neceſſary in the building of fortifications.

Profiles are generally conſtructed upon a ſcale of 30 feet to an inch. It would be endleſs to deſcribe the applications and their particular dimenſions.

Paterarah, is of the mortar kind; the diameter of the cylinder 4.1 inches, total length 9 inches; the length of the chamber 8 inches; inſtead of trunnions, there is a ſquare baſe at the breech 6½ inches long, 3 wide, and 1 inch thick, which is let into an axis. Two of them are mounted on one carriage. See conſtruction of carriages. They are light and very handy to throw grenades, and grape or caniſter ſhot; they are very ſuitable for partiſan ſervice in a woody country.

Platform, a floor of oak or pine planks laid on ſleepers, for cannon to run on when in battery. See battery.

Plunged. A place is ſaid to be plunged when a higher commands it, ſo as to ſire almoſt perpendicularly into it.

Polygon, a many ſided figure inſcribed in a circle;

The following table will ſhew the application in fortification.

	Forts.						Little fortification.				Men.		Great.	
Side of polyg.	80	90	100	110	120	130	140	150	160	170	180	190	200	260
Perpendicu.	10	11	12½	14	15	16	20	21	23	25	30	31	25	22
Faces baſtion.	22	25	28	30	33	35	40	42	45	47	30	53	55	60
Cap of ravel.	25	28	30	35	38	40	45	50	50	52	55	55	60	50

In the vertical columns are the numbers expreſſing the lengths of the exterior ſides, from 80 to 260. In the ſecond, the perpendiculars anſwering to thoſe ſides. In the third, the lengths of the faces of the baſtions; and in the fourth, the lengths of the capitals of the ravelins Forts are moſtly, if not always, ſquares; for which reaſon the perpendiculars are made $\frac{1}{8}$th of the exterior ſides; becauſe if they were more, the gorges of the baſtions would become too narrow. The little fortifications is chiefly deſigned for citadels, and are commonly pentagons; the perpendiculars are made one ſeventh of the exterior ſide; the mean is uſed in all kinds of fortification, from an hexagon upward to any number of ſides; and the great is ſeldom uſed but in an irregular fortification, where there are ſome ſides that cannot be made leſs without much expence; or in a town which is near a great river, where the ſides next the river are made from 200 to 260 toiſes; and as that ſide is leſs expoſed to be attacked than any other, the perpendicular is made ſhorter, which ſaves much expence. The faces of the baſtions are all two ſevenths of the exterior ſides, or nearly ſo, becauſe the fractions are neglected. It may be obſerved in general, that in all ſquares the perpendicular is one eighth of the exterior ſide, and all pentagons is one ſeventh, and in all the reſt, upwards of one ſixth.

The following table will ſhew the angles at the center and circumference of regular polygons, ſrom three to twelve ſides incluſive.

Names.	ſides	Angles at center.	Angles at circumference.
Trigon,	3	120° 00′	60° 00′
Square,	4	90 00	90 00
Pentagon,	5	72 00	108 00
Hexagon,	6	60 00	120 00
Heptagon,	7	51 25 5-7	128 34 2-7
Octagon,	8	45 00	135 00
Nonagon,	9	40 00	140 00
Decagon,	10	36 00	144 00
Endecagon,	11	32 43 7-11	147 16 4-11
Dodecagon,	12	30 00	150 00

Petards, a braſs pot, fixed upon a ſtrong ſquare plank, which has an iron hook to fix it againſt a gate or paliſades. This pot is filled with powder: which, when fired, breaks every thing about it; and thereby makes an opening to enter the place. He who loads, fixes, and fires the petard, is called the *petardier*.

Pieces of ordnance, includes all ſorts of great guns and mortars. Battering pieces which are generally uſed are 24 and 18 pounders. Field pieces are 12, 9, 6 and 3 pounders, and howitzers. A ſoldier's firelock is called a piece.

Pile, or pyramid, of bombs or balls, ſo termed from the form they uſe to ſtore them up in magazines. A general rule to calculate a compleat ſquare pile— Multiply the corner row by that row more one; multiply this product by twice the corner row more one, and divide by ſix. For a compleat triangular pile, multiply the baſe by the baſe one more, this product by the baſe more two, and divide by 6.

Point-blank, the poſition of a gun when laid level.

Quadrant, a quarter circle containing 90°, is an inſtrument of braſs or wood, uſed by gunners in elevating their guns to hit an object when fired, and by bombardiers in elevating their mortars.

Range, the diſtance from the battery to the point where the ſhot or ſhell touches the ground.

Range, random, when the piece is elevated at an angle of elevation of 45° upon a level place.

Recoil, or reſerve of a gun, its running back when fired, is occaſioned by the ſtruggling of the powder in the chamber, and its ſeeking every way to fly out. Guns whoſe vents are a little forward in the chace, recoil the moſt.

Ravelin, a detached piece on the counterſcarp of a ditch, before the curtain reſembling a half moon, except that it has no flanks.

Redan, a work forming a ſalliant angle.

Redoubt, a ſmall ſquare fort whoſe ſides are ſtraight lines, and parts do not flank each other.

Reduit, otherwiſe called a dungeon, in the caſtle method of fortifying, a ſmall but ſtrong place to which a garriſon may retire, when forced, in order to capitulate, and ſave their lives.

Rampart, an elevation of earth raiſed along the face of any work of ten or fifteen feet high, to cover the inner part of that work againſt the fire of an enemy.

Ricochet, a method of firing cannon and howitzers from one to eight elevations, when the ſhot or ſhell makes ſeveral grazes, which is very dangerous to the defendants, when the battery can be ſo placed as to fire in a line with the works to be fired into. The piece is to be charged with no more powder than is juſt ſufficient to throw the ſhot over the parapet, where it falls and riſes ſeveral times, ſweeping off all men in its courſe. The only defence againſt it is traverſes, but theſe take up much room, and incommode the defendants in their operation. See practice of howitzers.

Reliever, an iron ring fixed to a handle by means of a ſocket, ſo as to be right angles to it; it ſerves to diſengage the ſearcher of a gun, when one of its points are retained in a hole, and cannot be got out otherwiſe.

Scarpe, the inner edge of the ditch at the foot of the rampart or parapet.

Sanciſſion, a large pipe or bag, of cloth or leather, about an inch and a half diameter, filled with powder, leading from the chamber of a mine to the entrance of the gallery. It ſerves to give fire to the mine.

Scalade or *eſcalade*, a furious attack, upon a wall or rampart, carried on with various ſorts of ladders, to inſult by open force.

Scale: a right line divided into equal parts, repreſenting miles, fathoms, paces, inches, *&c.* uſed in making plans upon paper, giving each line its true length, *&c.*

Scour: to ſcour a line is to flank it ſo as to ſee directly along it, that a muſquet ball entering at one end, may fire to the other, leaving no place of ſecurity.

Shot, all ſorts of ball, either for cannon, muſket, carabines, or piſtols. Chain ſhot, two whole or half bullets joined together, either by a bar or chain of iron, which allows them ſome liberty aſunder, ſo that they cut and deſtroy whatever they happen to ſtrike in their courſe. Grape-ſhot, a certain number of ſmall ſhots, of iron or lead, quilted together with canvaſs and a cord about a pin of iron or wood, fixed upon a bottom in the ſame manner, the whole together weighing nearly as much as the ſhot of that caliber.

Shoulder of a baſtion, the angle formed by the junction of a face and a flank.

Siege: to beſiege a place is to ſurround it with an army, and approach it by paſſages made in the ground, ſo as to be covered againſt the fire of the place. To raiſe a ſiege, is to give over the attack of a place, quit the works thrown up againſt, and the poſts taken about it. To make or form a ſiege, there muſt be ſufficient to furniſh 5 or 6 reliefs for the trenches: pioneers, guards, convoys, eſcorts, *&c.* artillery, magazines furniſhed with a ſufficient quantity of warlike ſtores, proviſions of all ſorts, and an infirmary with phyſicians, ſurgeons, *&c.* To turn a ſiege into a blockade, is to give over the attack, and endeavour to take it by famine; for which purpoſe all the avenues, gates and ſtreams leading into the place, are ſo well guarded that no ſuccour can get in to its relief.

Swallow tail: an advanced work, generally placed on the counterſcarp, before a curtain. It has two branches, and its front is made tenaille faſhion.

Tactics: the art of diſciplining armies, and ranging them into forms proper for fighting and manœuvring.

Tambour, literally a porch, is, in fortification, a piece; made of ſtakes, joined cloſe together, or of ſtakes faced with thick planks having loop holes. Its uſe is to cover and protect a gate or door, and to flank the adjacent parts.

Terreplain, the ground incloſed within any works, alſo the top of a rampart, between its inner edge and banket.

Traverſe, a bank of earth made acroſs the terreplain of any work. In a covered way there are always two of them at each place of arms. They begin on the counterſcarp and extend to the glacis, in which an indenture is made, to have a paſſage round that end. The top is formed like a parapet, with the ſlope towards the branch, and they have a banket in the place of arms.

Talus, or epanlement; the ſlope given to the rampart or wall, that it may ſtand the faſter; which is more or leſs ſloped, according as the earth is looſer or more binding. All ramparts ſhould have a ſlope or talus on each ſide: that is, they ſhould be broader at the baſis than at the top. There are three ſorts of theſe epanlements, which are diſtinguiſhed by the terms exterior, interior and ſuperior talus. *Exterior talus*, is an outſide ſlope of a work towards the country. *Interior talus*, the inſide ſlope of a work, next the town. *Superior talus*, of the parapet, a ſlope on the top of the parapet, that allows of the ſoldiers defending the covert way with ſmall ſhot, which they could not do, were it level.

Tertiate a piece, is to examine it, whether it has the due thickneſs of metal in every part, and whether it be true bored.

Tube box: a tin box to carry tubes in: it is carried before by a waiſt belt: the bombardier or gunner who carries it tends the vent.

Toiſe, a meaſure of ſix feet, uſed by the French engineers in all their fortifications. A ſquare toiſe is 36 ſquare feet, and a cubic toiſe is 216 cubic feet.

Traverſe, a gun or mortar, is to bring her about with hand-ſpikes to the right or left, till ſhe points exactly at the object.

Trail-ſpike, or tiller, to ſteer the field carriage when marching with horſes or limbers. I think the term *tiller* is a more proper term, as by it the piece is traverſed or ſteered, being fixed in the trail tranſom. See conſtruction of field-carriages.

Trench, or line of approach and attack; a way hollowed in the earth in form of a foſſe, having a parapet towards the place beſieged, when the earth can be removed; or elſe it is an elevation of faſcines, gabions, wool-packs, and ſuch other things for covering the men as cannot fly in pieces or ſplinters. This is to be done when the ground is rocky; but when the earth is good the trench is carried on with leſs trouble, and the engineer demands only a proviſion of ſpades, ſhovels and pick-axes to make it two fathoms wide; in order to prevent being enfiladed they muſt be in a zigzag courſe. Return of a trench are the elbows and turnings, which forms the lines of the approach. To *mount the trench,* is to mount guard in the trenches; to *relieve the trenches,* is to come off guard from the trenches; to *cleanſe or ſcour the trenches,* is to make a vigorous ſally upon the guards and workmen; force them to give way, and quit their work; break down the parapet, fill up the trench, and nail their cannon. Counter-trenches are trenches made againſt the beſiegers, which conſequently have their parapet turned againſt the enemy's approaches, and are enfiladed from ſeveral parts of the place. To *open trenches*, is the firſt breaking of ground by the beſiegers, to carry on their approach towards a place.

Van, the front of an army.

Van guard: that part of the army which marches in front.

View of a place, to beſiege it, is ſaid to be taken, when the general, accompanied by the engineers, reconnoitres it: that is, they ride round the place, obſerving the particular ſituation of it, with the nature of the country about.

Wad is a ſtopper of hay, ſtraw, chunk or oakum, forced on the charge of powder, when firing with looſe powder or paper cartridges, to keep it cloſe in the chamber, and then the round ſhot is put in the cylinder, and a wad on that to keep it from rolling out, when the muzzle is depreſſed.

Wad mill: a hollow piece of wood to make the wads of a proper form.

Waggon maſter general, has the ordering and marching of all the baggage of the army, &c.

War is that important event for which all military education is deſigned, to prepare the ſoldier to defend the juſt right and claims of his country; and to ſecure internal felicity and the repoſe of ſociety from the outrages of barbarians.

Zigzag: a line changing its courſe in different directions, forming obtuſe and acute angles, according to circumſtances. Generally in carrying on approaches in a ſiege. See trenches.

In this chapter I have treated with as much perſpicuity as the nature of the ſubject would admit. I could have introduced a greater variety, but not wiſh-ing to tranſgreſs on the patience of my readers, have left the reſt for their reſearch.

This volume is ſwelled much larger than intended originally, but, in proſecuting the plan, many things were ſuggeſted to my mind which I conceived beneficial to the young artilleriſt in his progreſſive enquiries, to attain a knowledge of the various parts of his duty.

If this ſmall treatiſe, as far as has been attempted, ſhould in any degree anſwer the intended purpoſe, I ſhall be highly gratified; and ſhall always feel a plea- in rendering my military brethren any aſſiſtance in my power, in their endeavours to bring the duties of the artillery into a ſyſtematic form.

PLATE 1.

Explanation

⊠ Capt. Lieutenant

○ 2d. Lieutent.

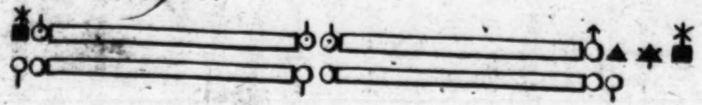


Fig. 1.

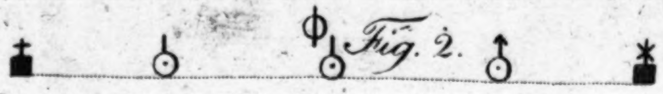
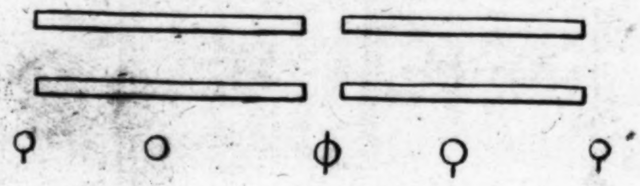


Fig. 2.



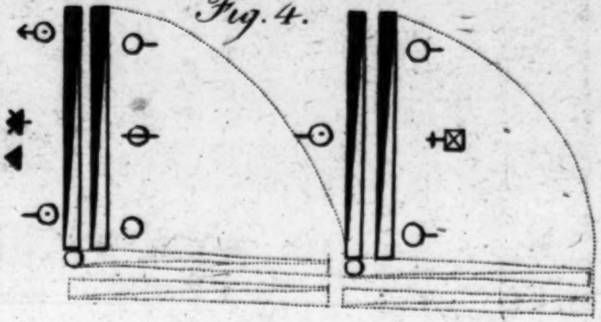


Fig. 4.

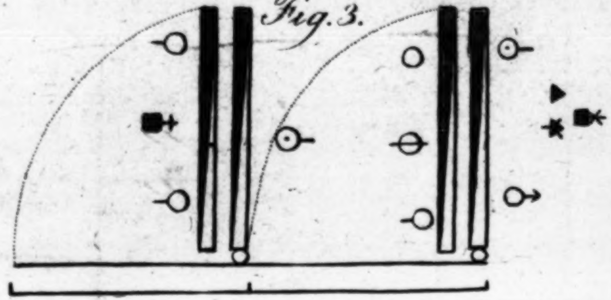


Fig. 3.

PLATE 2.

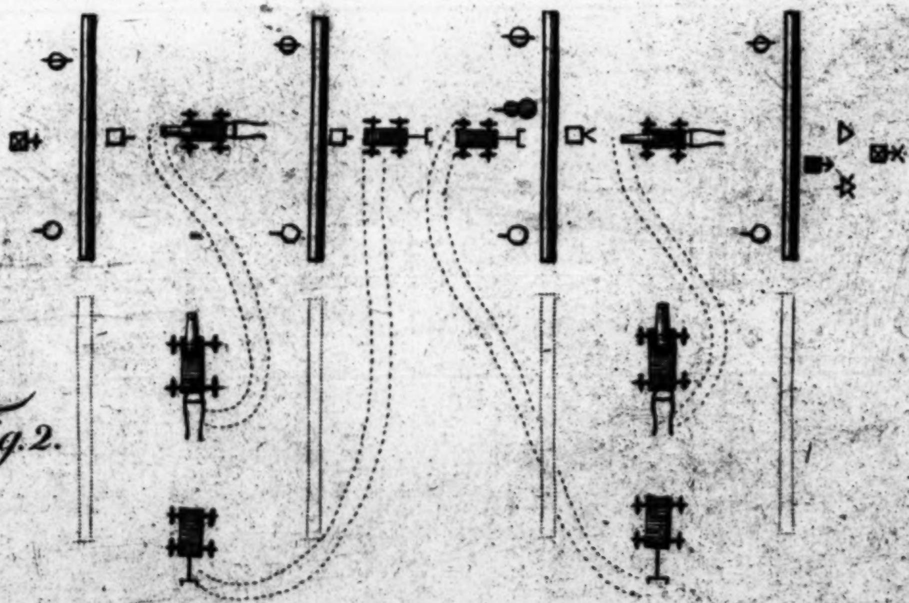


Fig. 1.

Fig. 2.

PLATE 3.

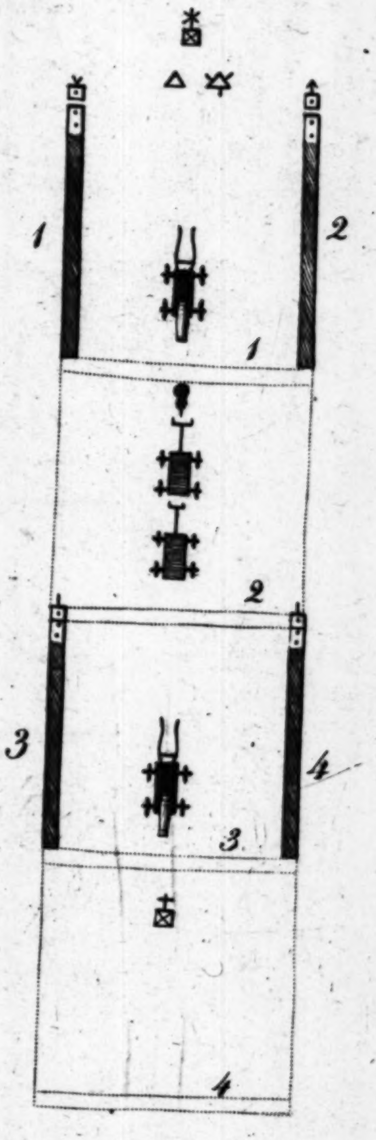


PLATE 4.

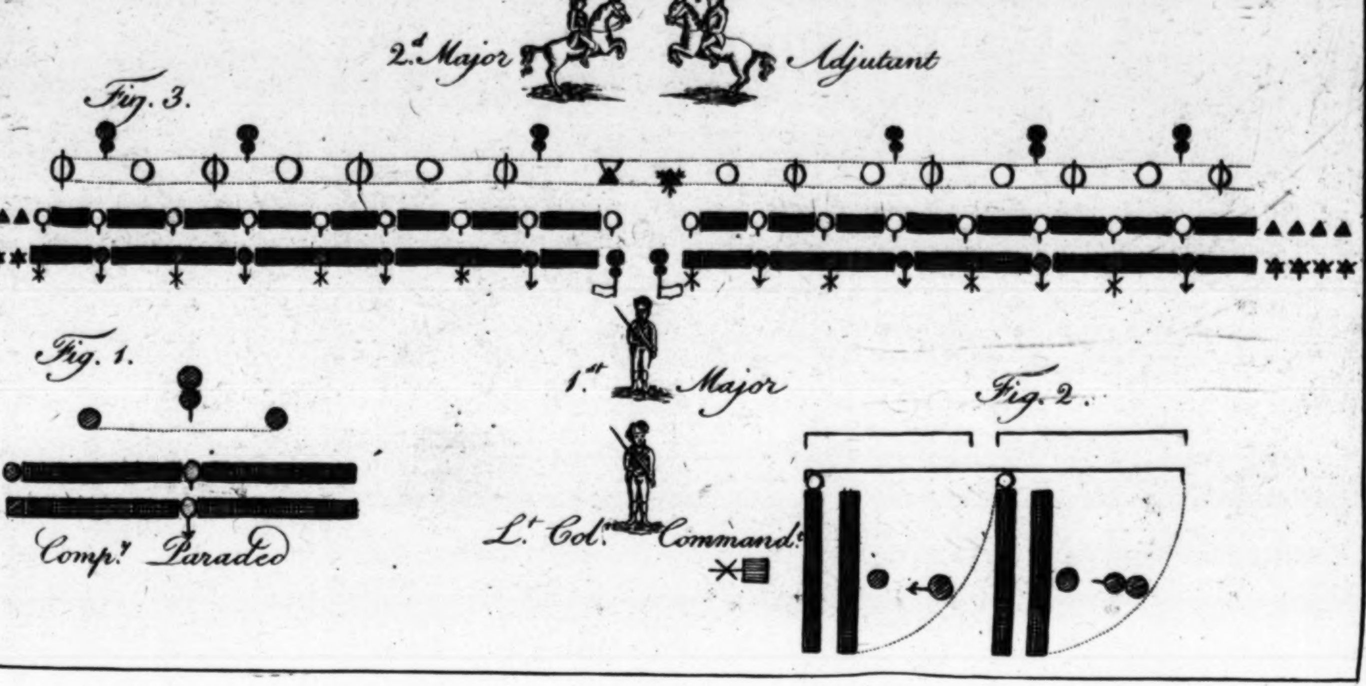
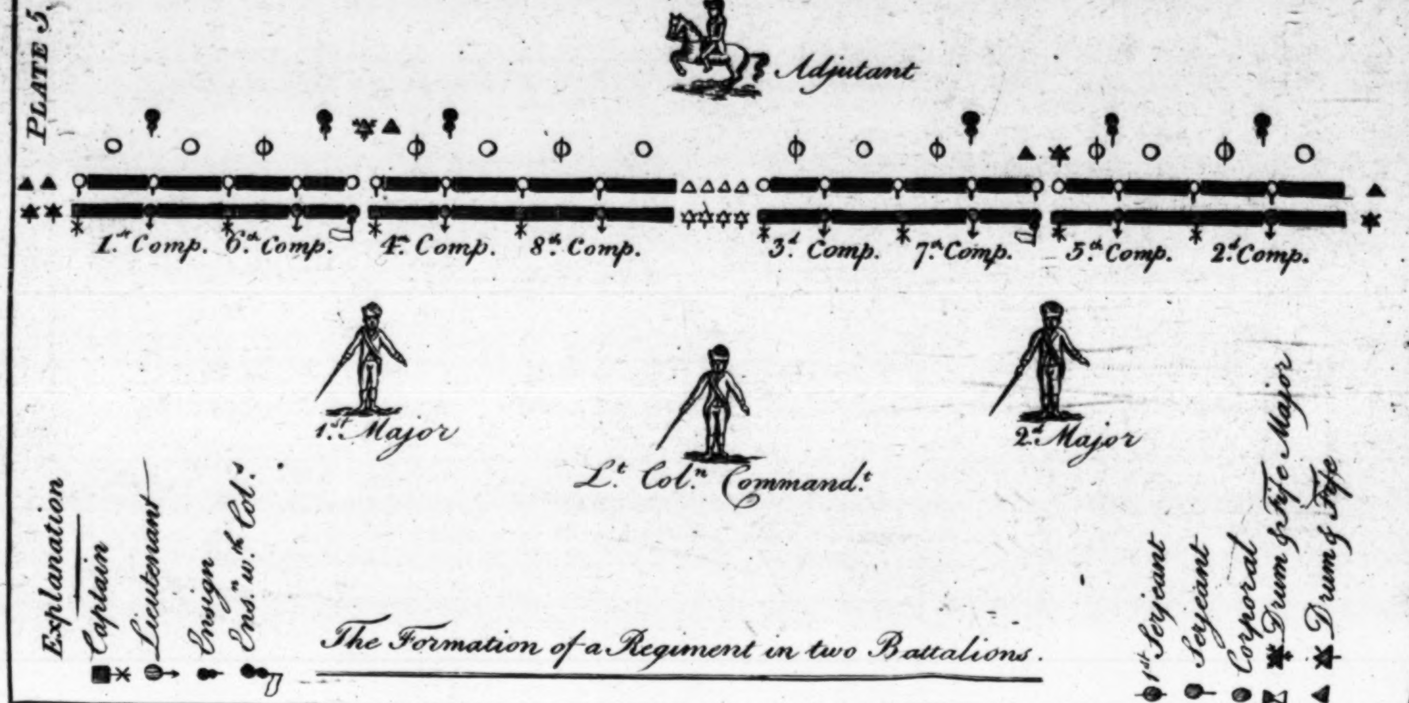

2.d Major
Adjutant
Fig. 3.
Fig. 1.
1.st Major
Fig. 2.
Comp.y Paraded
L.t Col.n Command.g

PLATE 5.



The Formation of a Regiment in two Battalions.

5

PLATE 6.

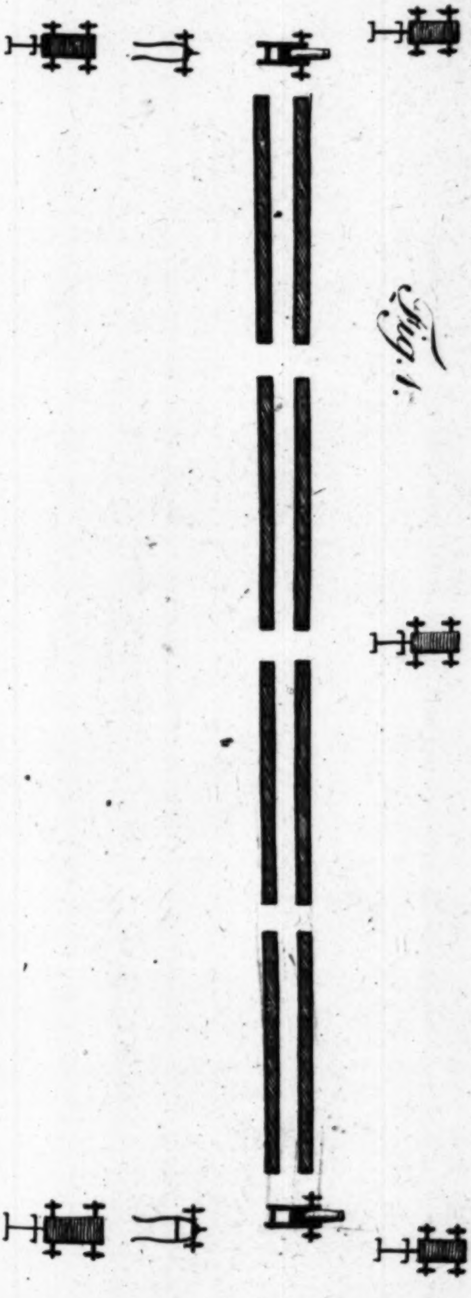


Fig. 1.

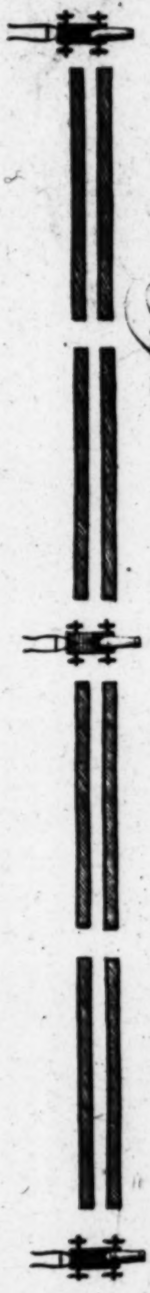


Fig. 2.

PLATE 7.

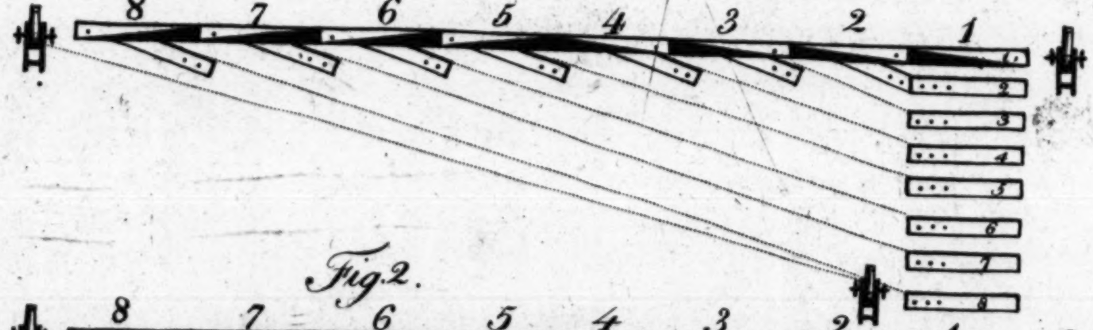


Fig. 1.

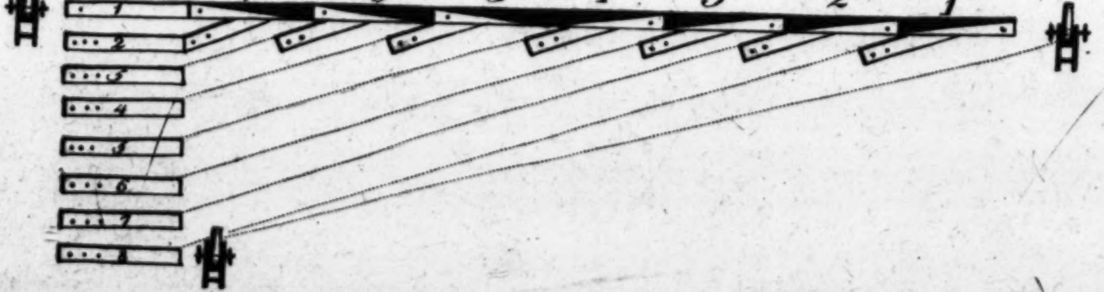


Fig. 2.

PLATE 8.

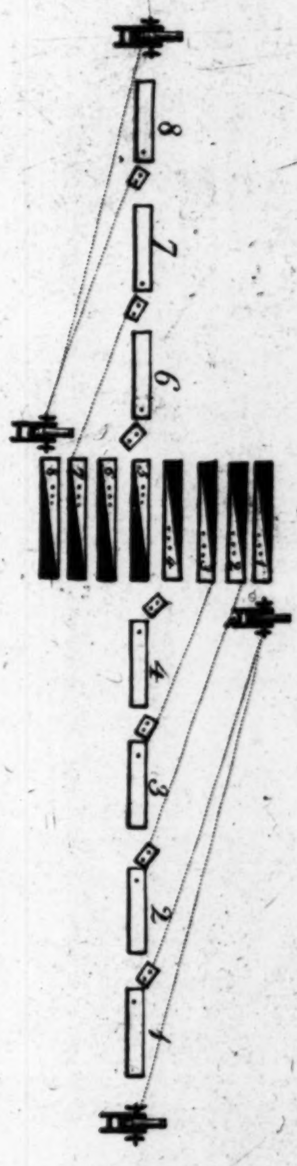


Fig 1

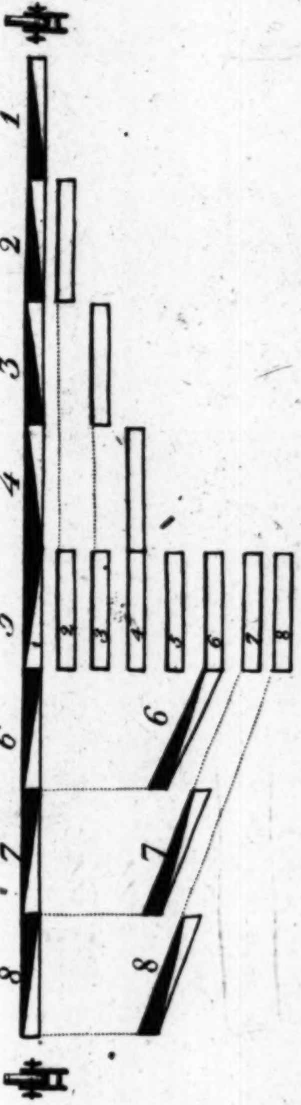


Fig 2

PLATE 9.

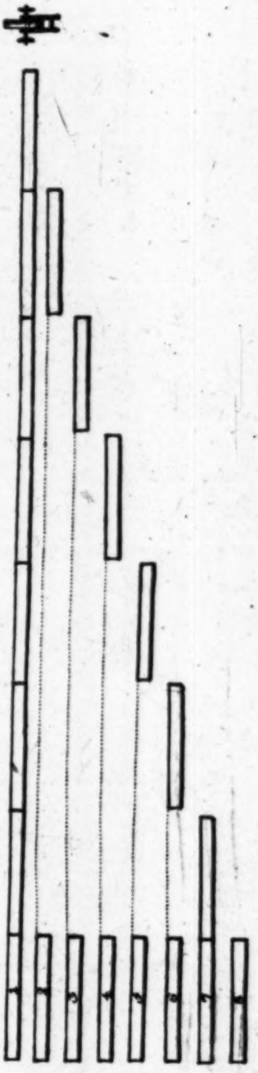


Fig. 1.

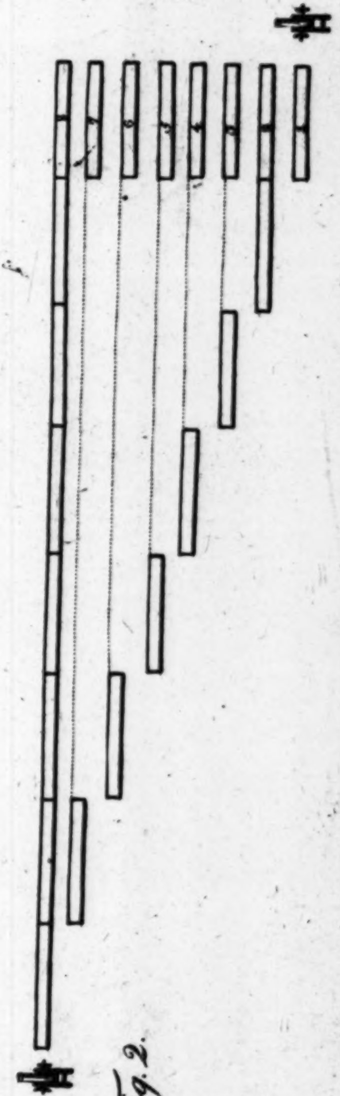


Fig. 2.

PLATE 10.

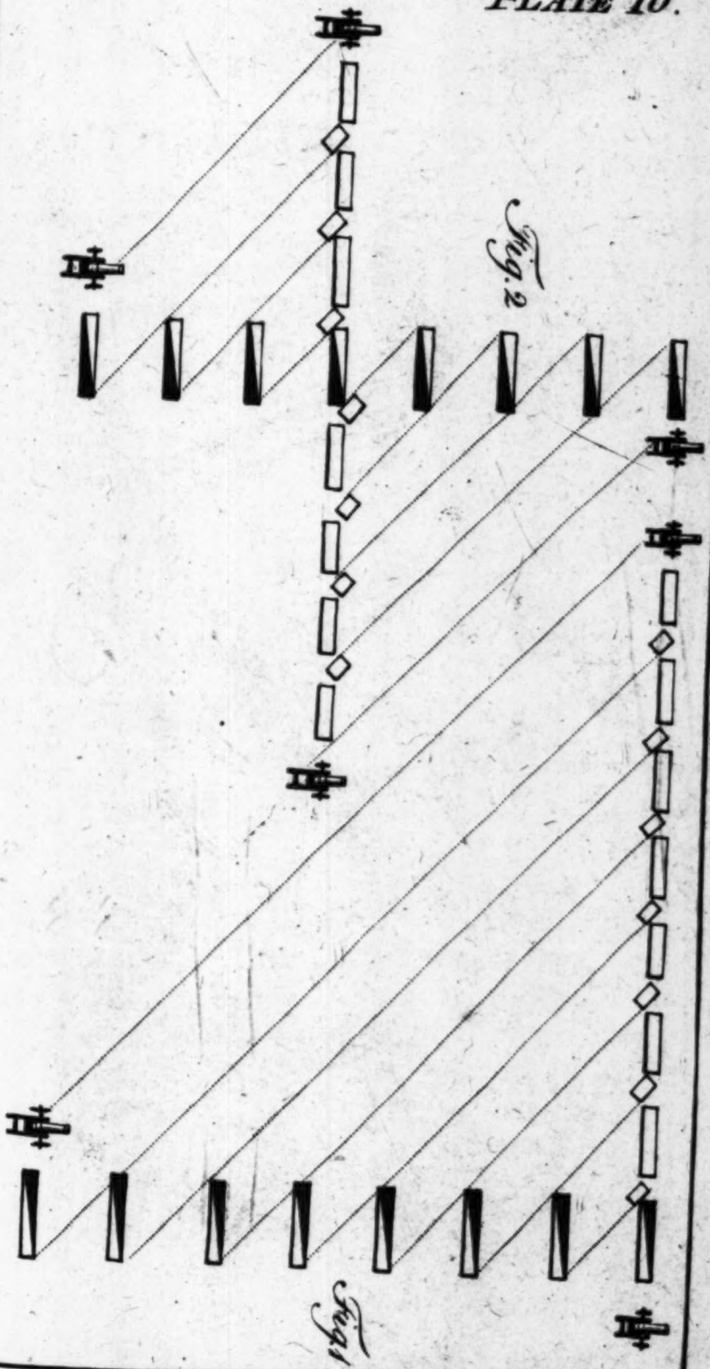
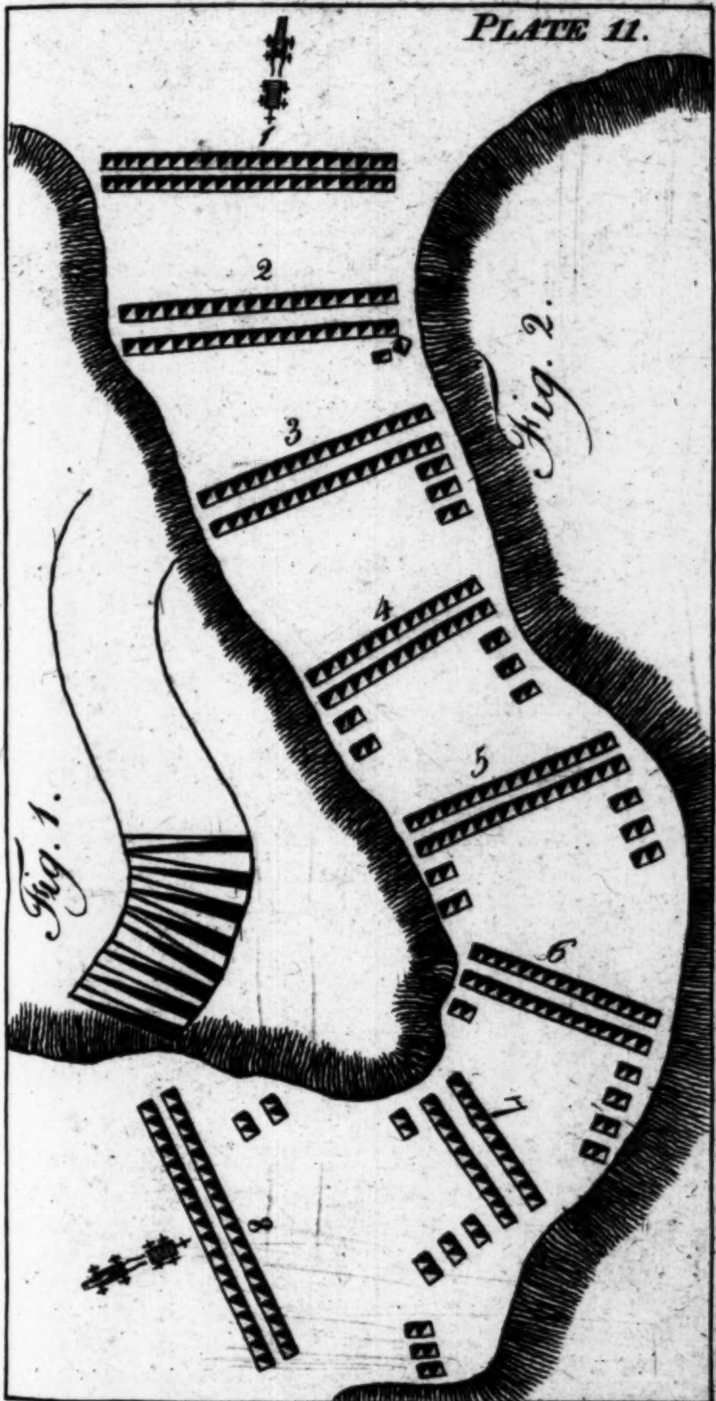


Fig. 2
Fig. 1

PLATE 11.



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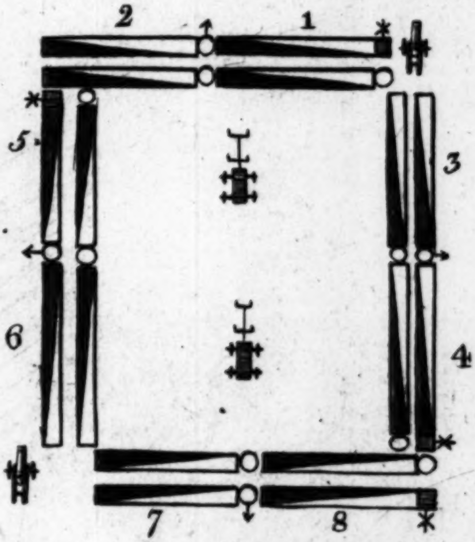


Fig. 2.

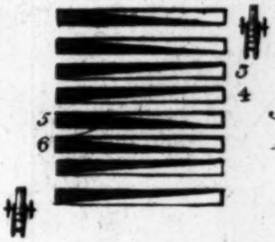


Fig. 1.

Fig. 3.

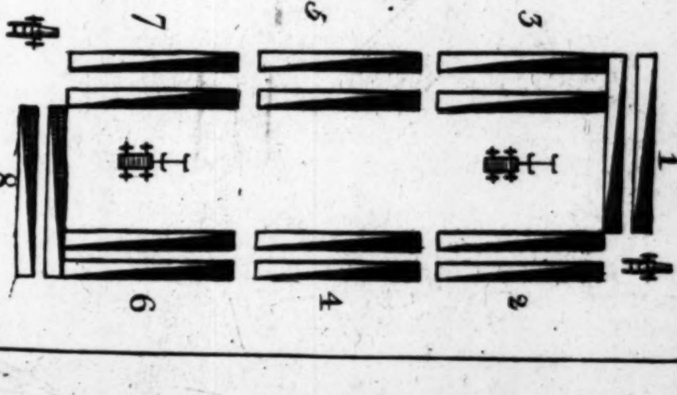


PLATE 13.

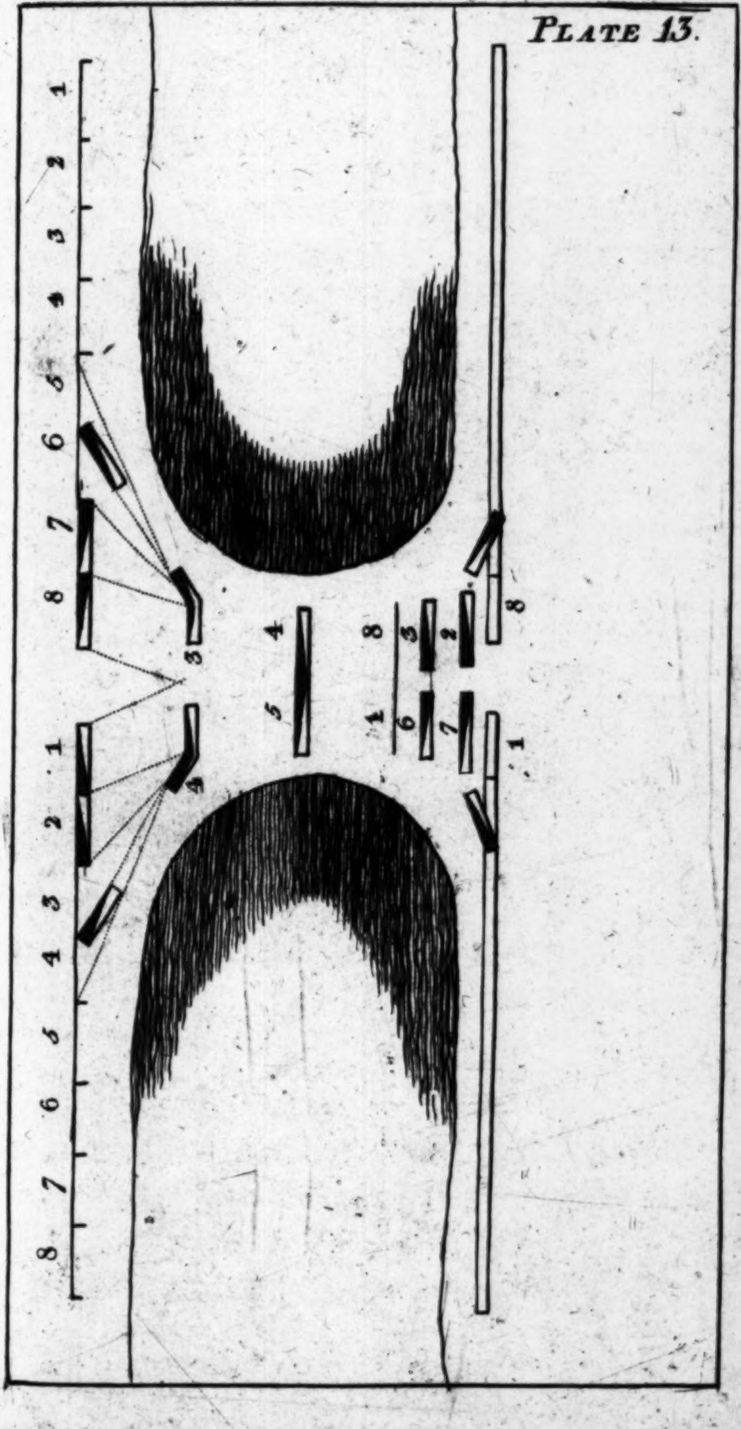
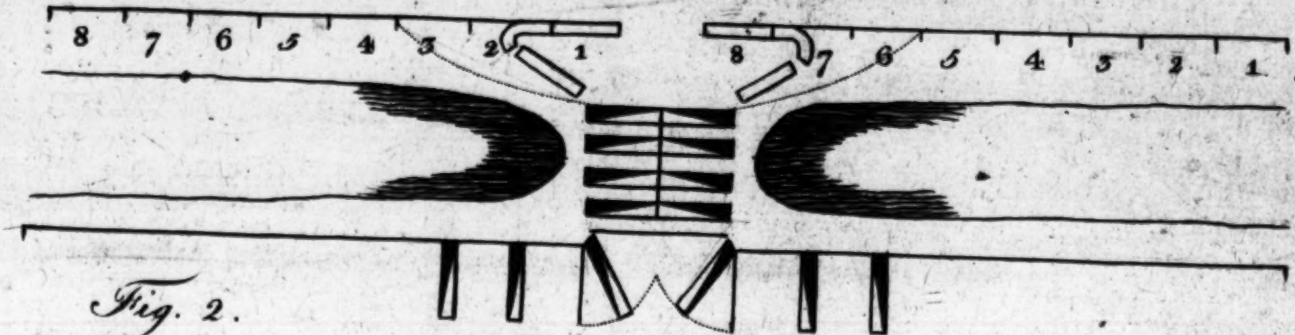


PLATE 14.

Fig. 1.



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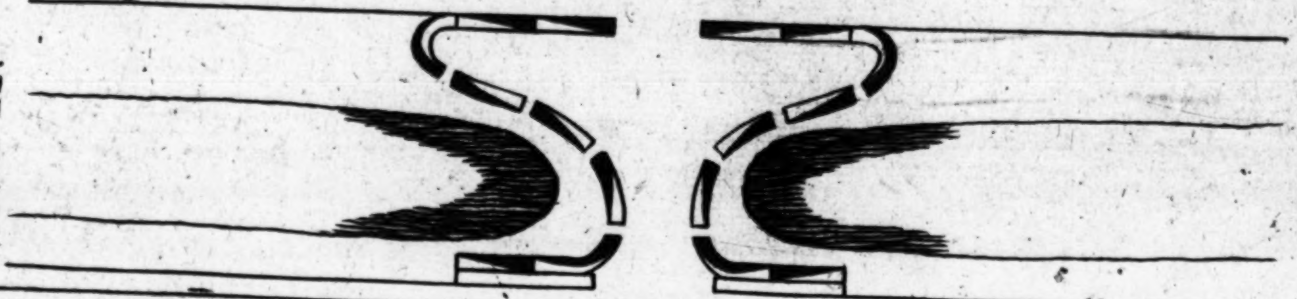
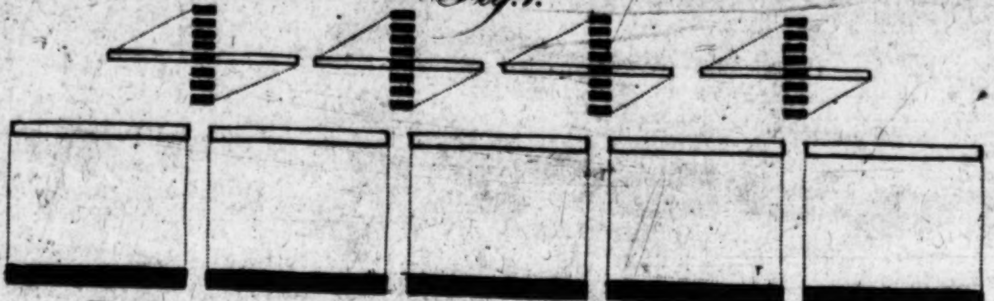


PLATE 15.

Fig. 1.



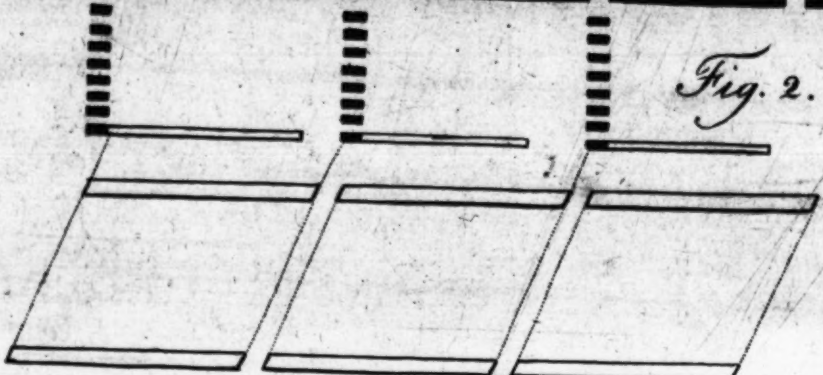


Fig. 2.

PLATE 16

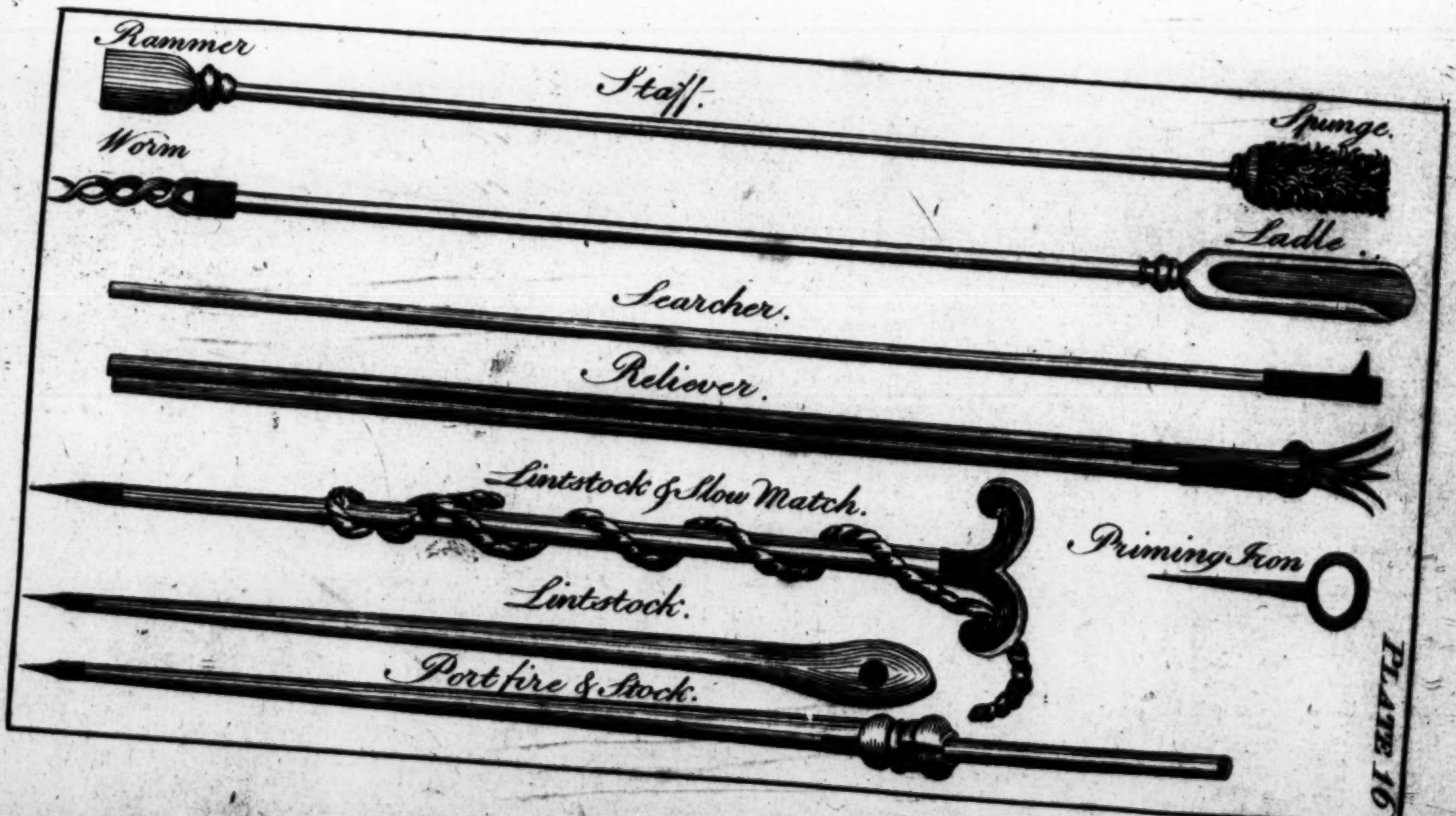
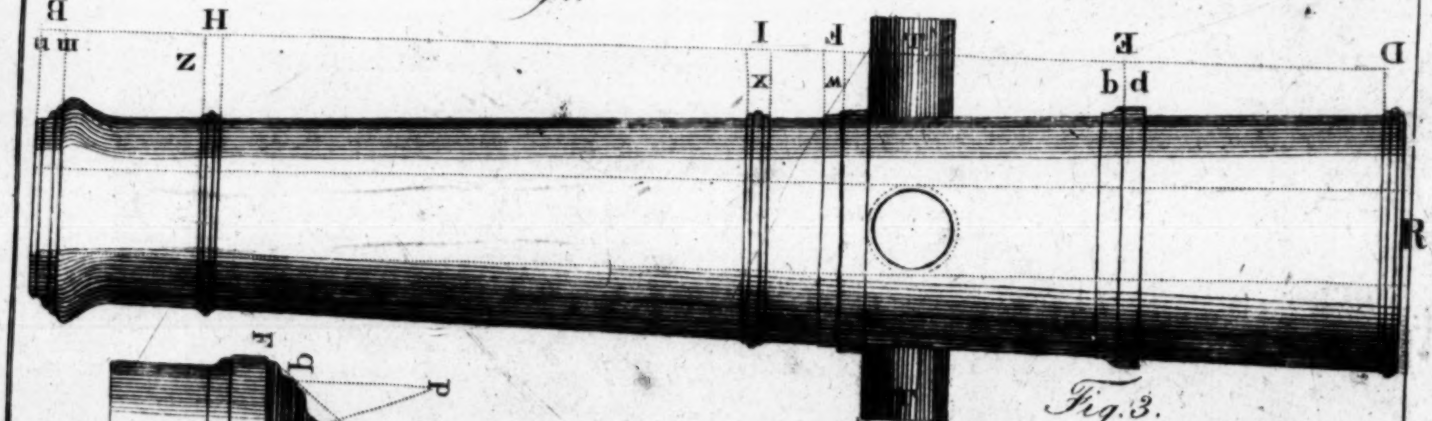

Rammer
Staff.
Spunge.
Worm
Ladle
Searcher.
Reliever.
Lintstock & Slow Match.
Priming Iron
Lintstock.
Port fire & Stock.

PLATE 17.

Fig. 1.



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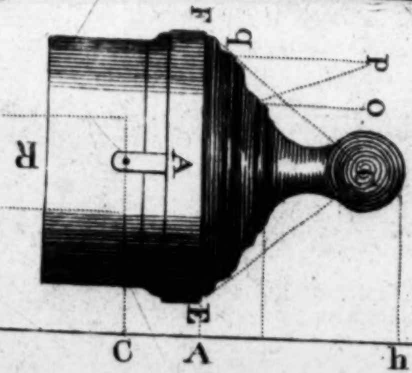
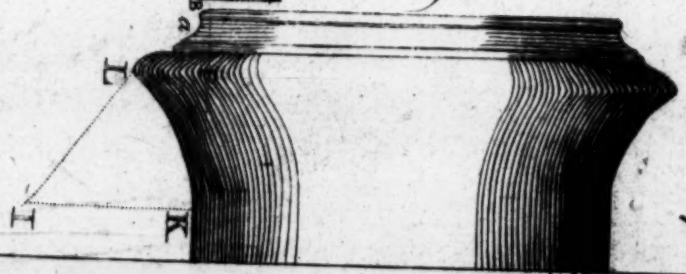


Fig. 3.



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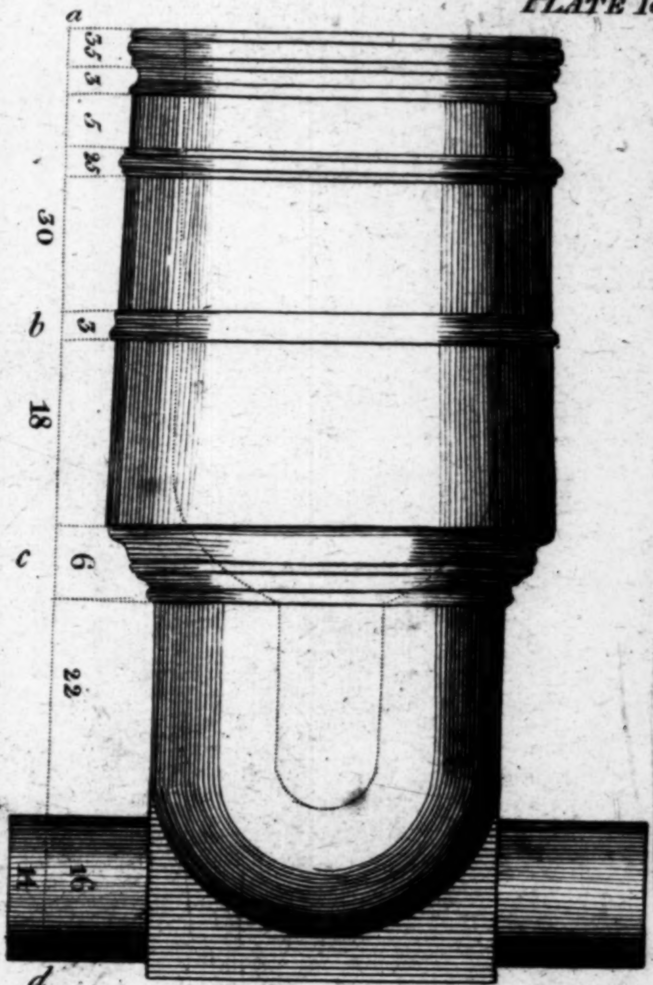


Land Morter

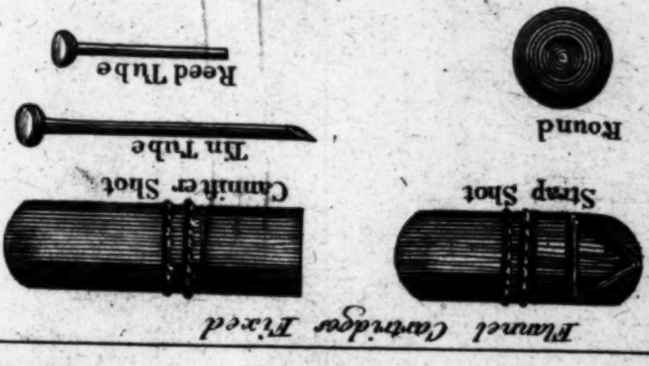


PLATE 19.

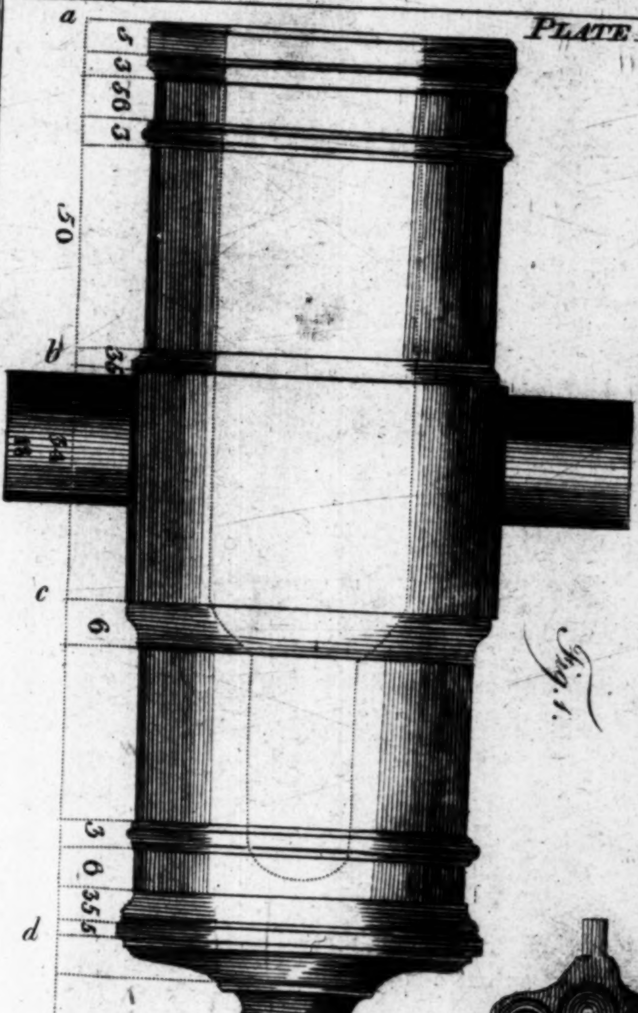
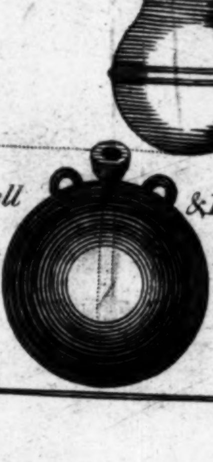
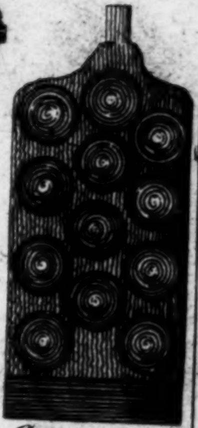


Fig. 1.

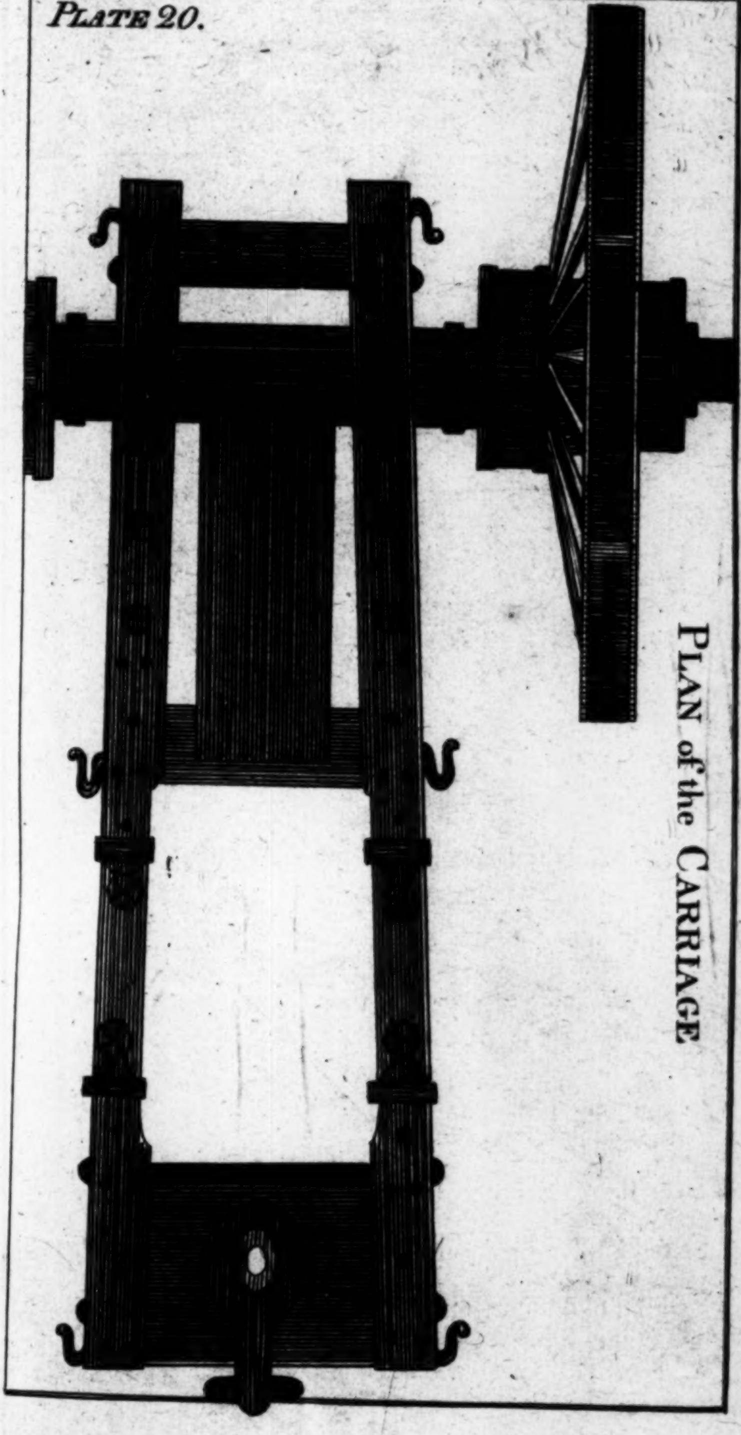


Bomb Shell &Fuse drove



Grape Shot

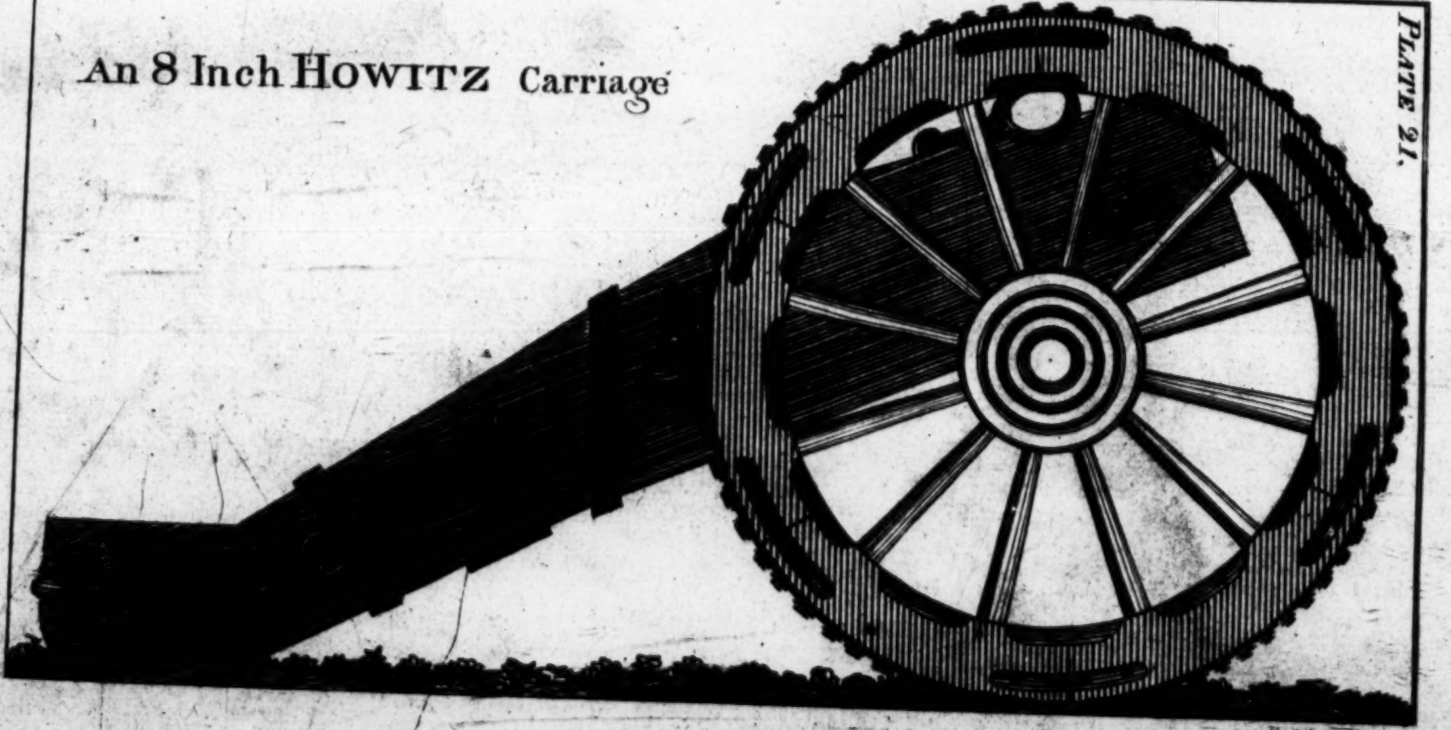
PLATE 20.



PLAN of the CARRIAGE

PLATE 21.

An 8 Inch HOWITZ Carriage



Rollinſon

Plate 22.

PLAN of the LIMBER

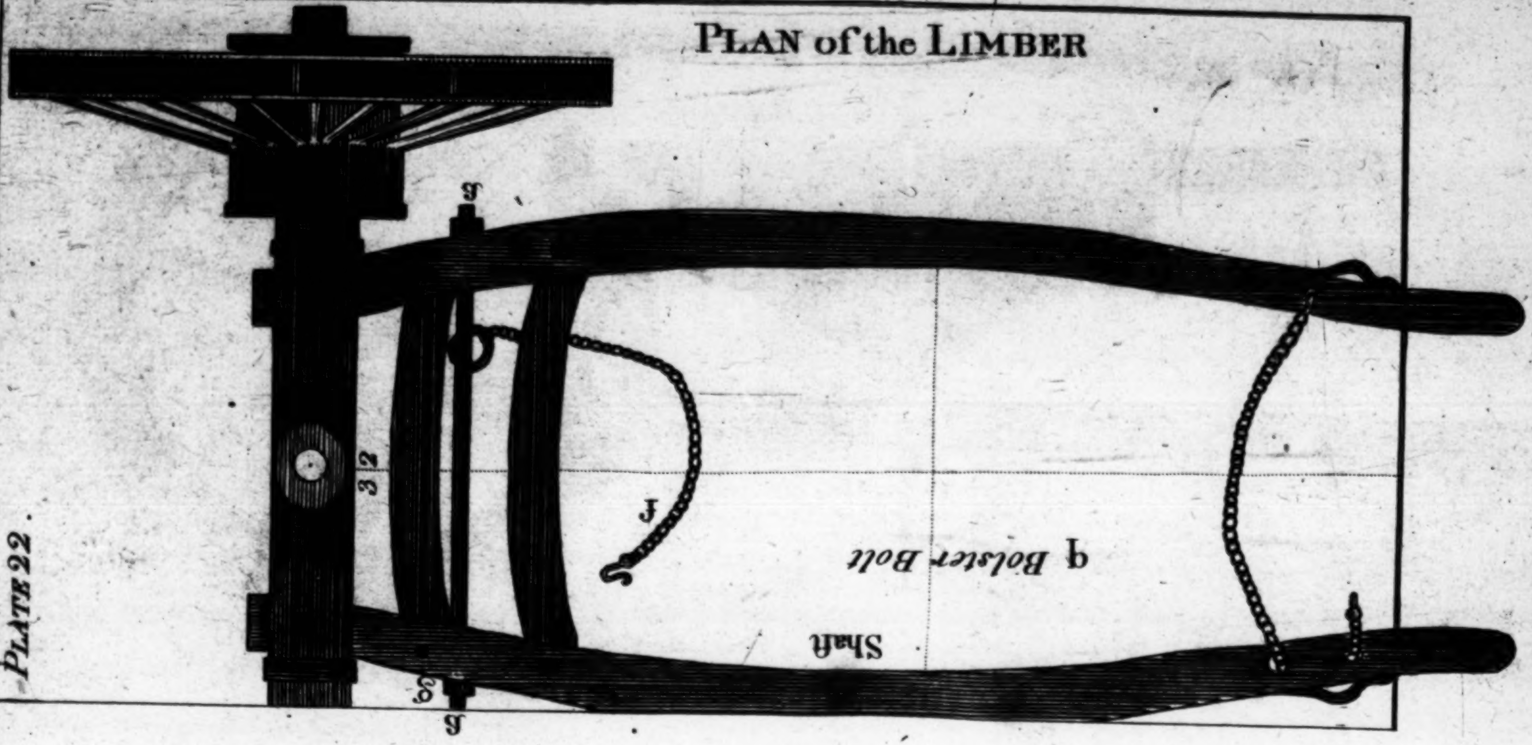
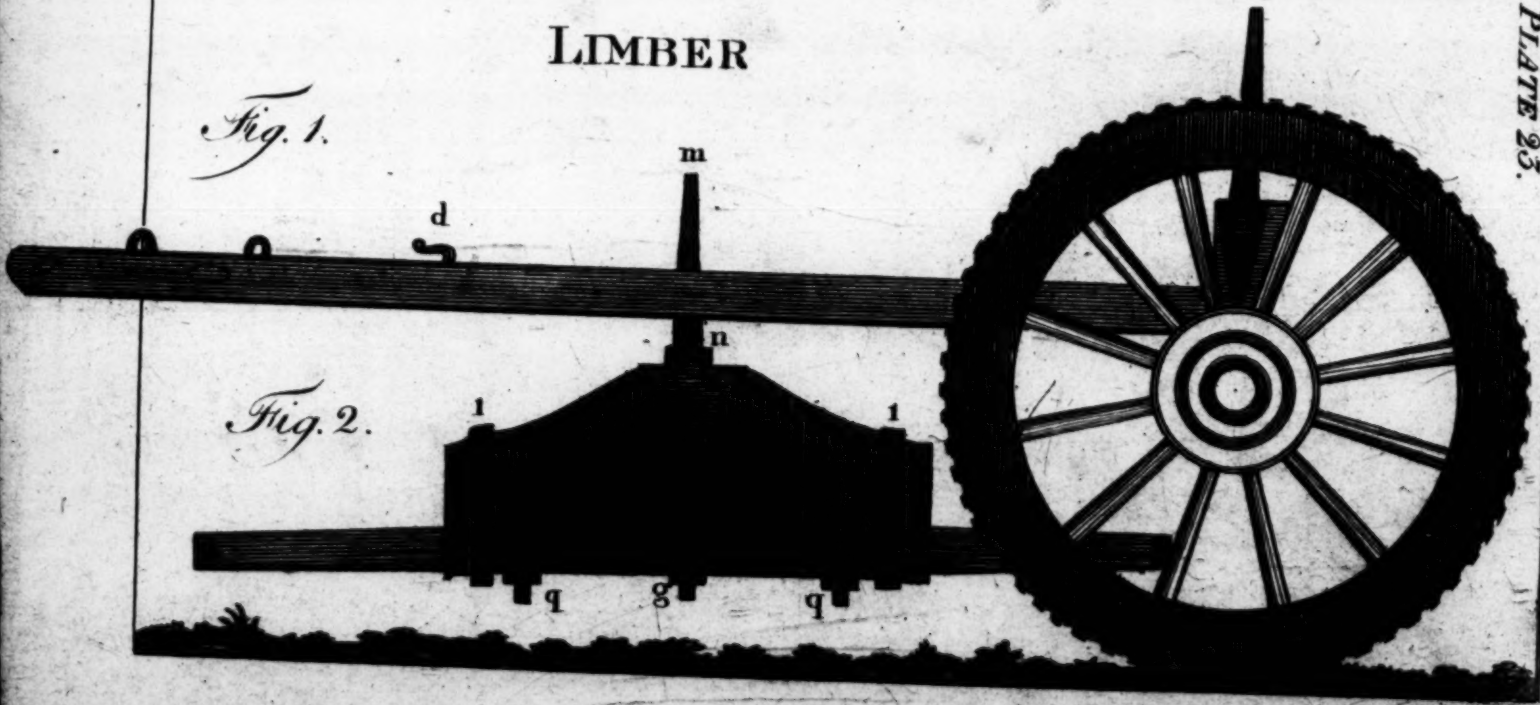


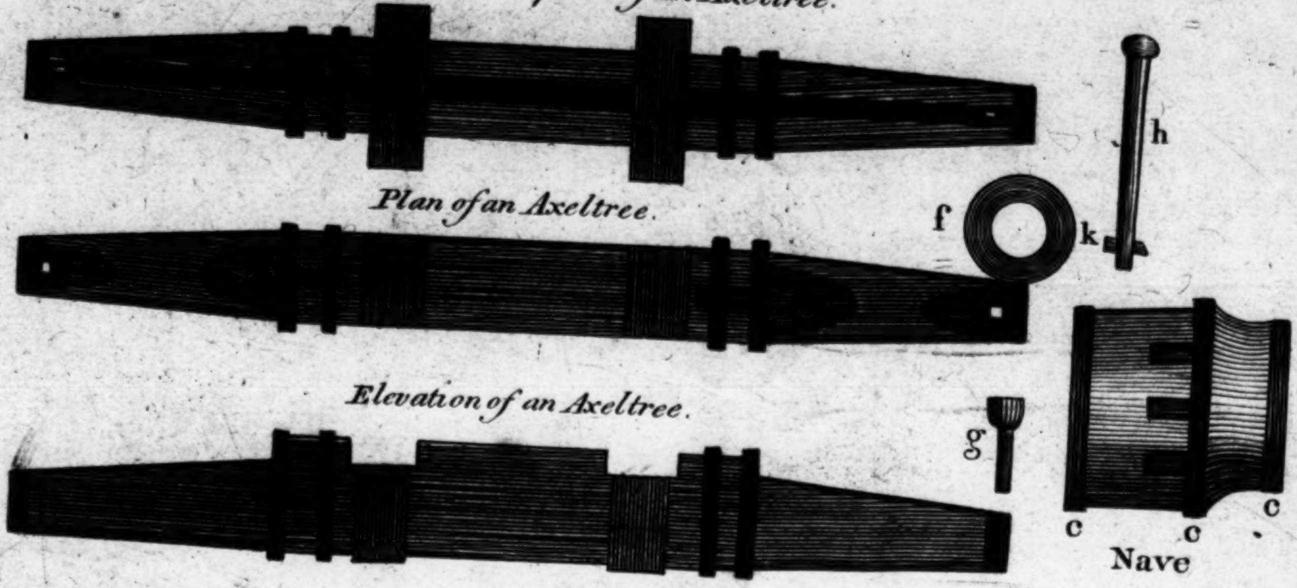
PLATE 23.

LIMBER



Rollinſon

PLATE 24.



View of the under part of an Axeltree.

Plan of an Axeltree.

Elevation of an Axeltree.

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